JVC

SERVICE MANUAL

VHS VIDEO MOVIE SYSTEMS VHSC

VHS VIDEO MOVIE

MODEL **GR-C7EG/EK**

CAR BATTERY CHARGER

MODEL **BH-V5E**

CARRYING CASE

MODEL **CB-V50U**

SHOULDER STRAP

MODEL **VU-V17U**

CARRYING BAG

MODEL **CB-V21U**

BELEGEXEMPLAR
SCHALTUNGSDIENST LANGE BERLIN

LFDNR.:

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No. 8458
July 1986

NOTE: For a technical description, please refer to Technical Guide T-8057 GR-C7 PAL.

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— OPTION —

EH-V5E

CB-V50U

VU-V17U

CB-V21U

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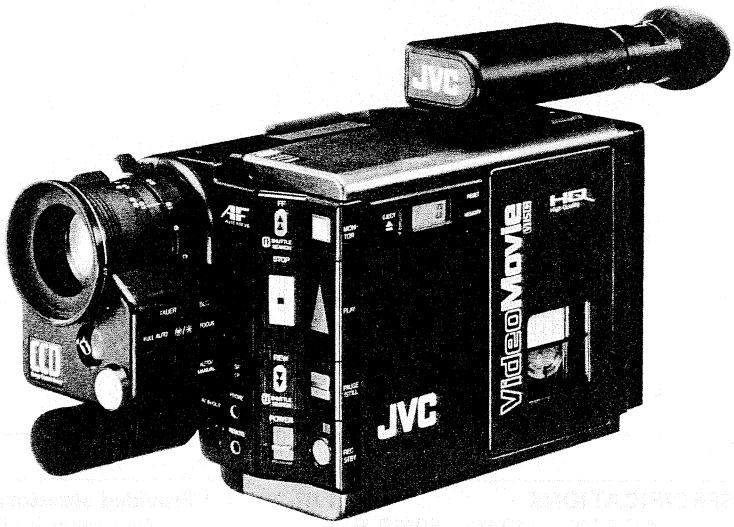
VHS VIDEO MOVIE VHS C PAL

GR-C7EG/EK

≈ VKR 6830



HQ High Quality

SPECIFICATIONS

Format		: VHS standard
Power source		: DC 9.6 V ⎓
Power consumption		: 8.0 watts
Signal system		: PAL
Recording system		: Luminance: FM recording Colour: Converted sub-carrier direct recording Conforms to VHS standard
Cassette		: VHS-C cassette
Tape speed	(SP)	: 23.39 mm/sec
	(LP)	: 11.70 mm/sec
Recording time		
Max.	(SP)	: 30 minutes (with EC-30 cassette)
	(LP)	: 60 minutes (with EC-30 cassette)
VIDEO		
Output		: 1 Vp-p, 75 ohms, unbalanced (via AV OUT connector)
S/N ratio		: 40 dB (with Rohde & Schwarz noise meter)
AUDIO		
Output		: -6 dBs, 1 k-ohm (via AV OUT connector)
Microphone input		: -68 dBs, high impedance, unbalanced

Pickup	: 1/2''-format CCD
Minimum required illumination	: 15 lux (at F 1.6)
Illumination range	: 15 – 100,000 lux
Lens	: F 1.6, f = 9 – 54 mm, 6:1 power zoom lens with auto iris control and macro position, filter diameter 49 mm
Viewfinder	: Electronic viewfinder with 0.6'' black/white CRT
Colour temperature switching	: Switchable (3,200 K/5,500 K)
White balance adjustment	: Full-auto/preset standard
Operating temperature	: 0°C to +40°C
Operating humidity	: Less than 80 %
Storage temperature	: -20°C to +50° C
Weight	: 1.4 kg (with viewfinder)
Dimensions	: 121(W) x 165(H) x 223(D) mm (incl. viewfinder)

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AA-V2EG/EK SPECIFICATIONS

Power supply	: AC 110 – 240 V~, 50/60 Hz
Power consumption	: 30 watts
Rated output voltage	: DC 9.6 V ⎓
Rated output current	: 1.2 A
Charging system	: Constant current, peak detection, timer controlled
Dimensions	: 57(W) x 67(H) x 200(D) mm
Weight	: Approx. 700 g

C-P3U SPECIFICATIONS

Type	: VHS cassette adapter
Dimensions	: 188(W) x 25(H) x 104(D) mm
Weight	: 235 g
Accessory	: "R6"-size battery x 1

RF-P1E SPECIFICATIONS

Output channel	: UHF channels 32 – 40 (adjustable)
Initial channel setting	: UHF 36
Power source	: DC 8 V ⎓ 20 mA (from VideoMovie)
Dimensions	: 55(W) x 93(H) x 24(D) mm excl. cable
Cable length	: 2.5 m
Weight	: Approx. 160 g

Provided accessories

- High-capacity battery pack (1.0 AH) NB-P7U
- AC power adapter/battery charger AA-V2EG/EK
- RF unit RF-P1E
- Aerial cable
- Dubbing cable x 2
- Compact video cassette EC-30
- Cassette adapter C-P3U
- Electronic viewfinder VF-V7E
- Shoe adapter
- Lens hood
- Lens cap
- Shoulder strap VU-V17U
- Carrying case CB-V50U
- Grip pad

Optional accessories

- Regular battery pack (0.5 AH) NB-P5U
- Medium-capacity battery pack (0.7 AH) NB-P6U
- High-capacity battery pack (1.0 AH) NB-P7U
- Super high-capacity battery pack (1.8 AH) NB-P8U
- AC power adapter/battery charger AA-V2EG/EK
- Car battery charger BH-V5E
- Car battery cord AP-P1E
- Cassette adapter C-P3U
- Compact video cassette EC-30
- Carrying bag CB-V21U
- Shoulder strap VU-V17U
- Carrying case CB-V50U
- Remote control unit RM-P1U
- A/V extension cable VC-P2U
- Conversion cable VC-V810U
- Character generator CG-P50E

Design and specifications subject to change without notice.

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded ( ) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

4. Use specified insulating materials for hazardours live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors

5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

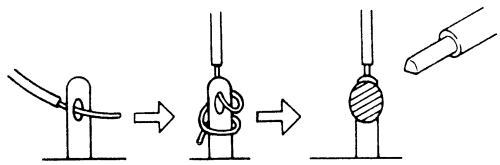


Fig. 1

6. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

7. Check that replaced wires do not contact sharp edged or pointed parts.

8. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosent it.

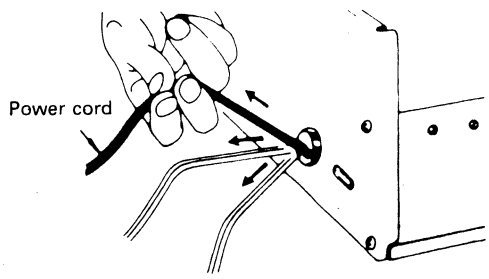


Fig. 2

9. Also check areas surrounding repaired locations.

10. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the parts specified. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission form the cathode ray tube.

11. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perfomr carefully and precisely according to the following steps.
    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

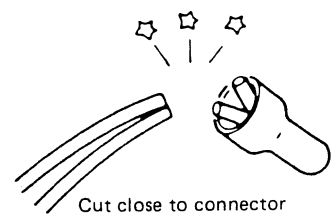


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

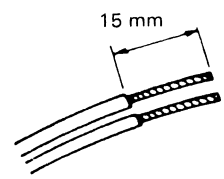


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

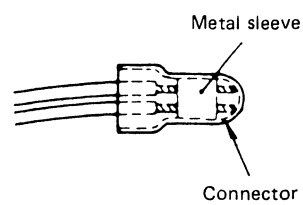


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

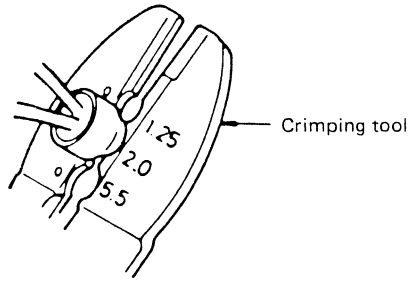


Fig. 6

(5) Check the four points noted in Fig. 7.

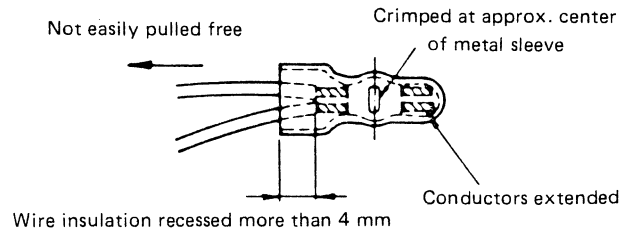


Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, performe the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See tabel below.

3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table below.

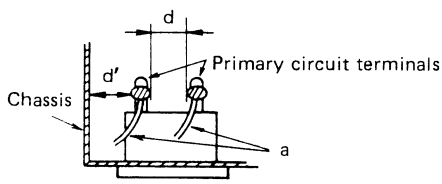


Fig. 8

4. **Leakage current test**
   Confirm specified or lower leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

   Measuring Method: (Power ON)
   Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure and following table.

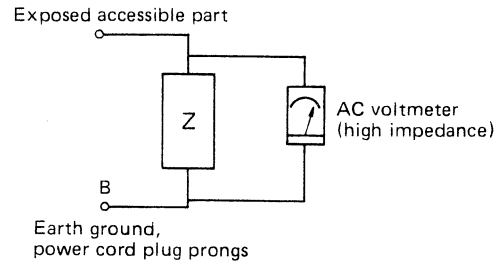


Fig. 9

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	≧ 1 mΩ/500 V DC	1 kV 1 minute	≧ 3 mm
110 to 130 V	USA & Canada	—	900 V 1 minute	≧ 3.2 mm
*110 to 130 V 200 to 240 V	Europe Australia	≧ 10 mΩ/500 V DC	4 kV 1 minute	≧ 6 mm (d) ≧ 8 mm (d') (a: Power cord)

*Class II model only.

Table 1 Ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (b) to:
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

Table 2 Leakage current ratings for selected areas

Note: This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

INSTRUCTIONS

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

This equipment should be used with 9.6 V ⎓ only.
CAUTION:
To prevent electric shocks and fire hazards, do NOT use any other power source.

The AA-V2EG AC Power Adapter/Battery Charger should be used with 110 – 240 V∿, 50/60 Hz only.
Caution:
To prevent electric shocks and fire hazards, do NOT use any other power source.

IMPORTANT (In the United Kingdom)
Mains Supply (240 V∿, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:

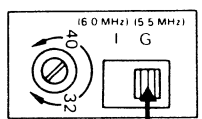
Blue to N (Neutral) or Black
Brown to L (Live) or Red

If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black.
Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.
Note
We recommend that you should disconnect the AC cord from the outlet.

VHSC PAL HQ High Quality

- VideoMovie is designed exclusively for the VHSC video cassette. Only cassettes marked VHSC can be used with this unit.
- HQ VHS is compatible with existing VHS equipment.

Thank you for purchasing the JVC **GR-C7E** Auto-focus VideoMovie. Weighing only 1.4 kg, the Auto-focus VideoMovie comprises an auto-focus CCD video camera, and recording and playback functions in a single compact unit for the most convenient live recording capability available today. The Auto-focus VideoMovie uses the VHS recording system and compact video cassettes to make recordings compatible with all VHS recorders. It can also be connected to your television set for direct playback of cassettes; no additional video equipment is required.
To take best advantage and gain the most service from your Auto-focus VideoMovie, read this instruction booklet carefully and thoroughly.



ATTENTION:
The system select switch on the rear of the provided RF unit RF-P1E has been set to G (Continental PAL, 5.5 MHz).

CAUTION:
To prevent shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified personnel.

NOTES:
- The rating plate (serial number plate) and safety caution of the main unit are on its bottom.
- The rating plate (serial number plate) of the viewfinder is on its bottom.
- The rating plate (serial number plate) of the AC power adapter/battery charger is on its side.

The provided viewfinder is the VF-V7E. Do not use any other viewfinder with the GR-C7E.

This equipment has been produced to comply with Directive number 82/499/EEC.

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FEATURES

- Allows direct recording and playback with no additional components necessary.
- Ultra-compact and ultra-lightweight: a mere 1.4 kg.
- *Maximum of 60 minutes recording time in LP mode.*
- HQ (High Quality) System for super picture quality.
- Super-performance camera using a CCD (Charge Coupled Device) pickup highly resistant to shock and vibrations less susceptible to burn for semi-permanent, trouble-free operation.
- Full-auto camera operation (image-sensing auto-focus, auto-tracking white balance, auto iris with BLC).
- Ultra-compact adjustable electronic viewfinder (monochrome CRT, 0.6-inch screen) with diopter control, also for instant on-the-spot playback.
- High-sensitivity/low-lag design: allows shooting in light as low as 15 lux.
- High-performance 6:1 power zoom lens with macro position.
- Three-way power supply flexibility: battery pack, AC power adapter and car battery.
- Selectable quick review function.
- One-button recording standby mechanism.
- Improved assemble-edit accuracy.
- Shuttle search in both directions.
- Ergonomic design with palm grip and finger rest for trigger control.
- Complete package in a durable case.

The GR-C7E is designed to be used with PAL-type colour television signals. It cannot be used for playback with a television of a different standard. However, live recording and viewfinder playback are possible anywhere. Use the NB-P5U/NB-P6U/NB-P7U/NB-P8U battery packs and, to recharge them, the provided multi-voltage AC power adapter/battery charger. (An appropriate conversion adapter may be necessary to accommodate different designs of AC outlets in different countries.)

PRECAUTIONS

For safety, strictly observe the following instructions.
- Do not open the cabinet.
- Prevent inflammables, water and metallic objects from entering the unit.
- Do not disassemble or modify the unit.
- Do not use the unit when there is lightning in the vicinity. Disconnect the power cable of connected equipment.

Avoid using the unit under the following conditions:
- Places subject to excessive humidity or dust.
- Near appliances generating strong magnetic or electric fields (speakers, broadcasting antennas, etc.).
- Places subject to soot or steam such as near a cooking stove.
- Places subject to excessive shock or vibration.
- Near a television set (rolling pictures or howling might result).
- Extremely hot places.

Do not expose the unit to high temperatures over 50°C for long periods.

If the unit should be subjected to direct sunlight, or left in a closed car in summer, or placed near a heater, the CCD and the auto-focus sensor may deteriorate and the cabinet may become deformed. Furthermore, this also may cause the transistors and other electronic and mechanical parts to malfunction. Remember the following:
- Do not use the unit in places of over 40°C.
- Do not use the unit in places of below 0°C.
- Do not use the unit in humid places of over 80 %.
- For long storage, select a place between -20°C and 30°C.

Take special care for protection of the unit.
- Do not allow the unit to become wet.
- Do not leave the unit in closed cars on hot summer days.
- Take special care not to drop the unit or strike it against hard objects. Protect from shocks during transportation.

Make it a rule to observe the following instructions.
- Do not remove the battery pack or disconnect other power supply units during recording or playback before pressing the POWER switch to OFF. If not observed, this will cause tape damage.
- When the unit is not in use, remove the battery pack.

Keep the lens and viewfinder eyepiece always clean.
- When the lens is dirty or dusty, blow it off first and then gently wipe with a soft brush or lens cleaning paper.
- The lens is likely to become moldy if left dirty.

Be careful not to damage the CCD and auto-focus sensor.
- Do not keep the lens directed at extremely bright objects such as the sun or other light sources for long periods. Although the CCD is less susceptible to such burn than a tube would be, caution should be exercised when using this unit. Most importantly, the lens should be capped except while actually shooting.
- Do not direct the eyepiece of the viewfinder at the sun.

Auto-focus requires a bit of consideration.
- Do not touch the focus ring while the auto-focus mechanism is in operation as this could damage the auto-focus mechanism.
- When a filter or a special-effect lens is to be attached to the end of the lens, be sure to turn power off or switch from the Auto-focus mode to the Manual mode. NEVER attempt to attach a filter or lens while the auto-focus mechanism is operating as this will result in malfunctioning. (If a teleconversion or wide-angle conversion lens is attached, the auto-focus mode cannot be used.)

Handle the unit carefully.
- Protect the microphone from excessive shocks.
- Do not carry the unit by holding it only by the viewfinder.

Moisture condensation disenables use of the unit.

- You have observed that pouring a cold liquid into a glass will cause drops of water to form on the glass's outer surface. This same phenomenon occurs on the head drum of a video recorder when the recorder is moved from a warm place to a cool place, after heating a cold room, under extremely humid conditions or in a place directly subjected to the cool air from an air conditioner.
- Moisture on the head drum can cause severe damage to the video tape, and can lead to internal damage to the recorder itself.
- If moisture condensation occurs on the head drum, a condensation warning appears in the counter display and the unit enters the Stop mode, unable to function. In such a case, wait for a few hours until the indicator disappears.

Maintenance

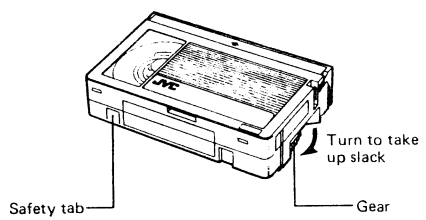
- When the cabinet is dusty, clean by gently wiping with a soft cloth.
- Avoid the use of strong cleaning agents such as benzine or alcohol as they may damage the cabinet.
- Cleaning should be done only after the battery pack has been removed or other power units have been disconnected.

Serious malfunctioning

If malfunctioning occurs, stop using the unit immediately and consult your local JVC dealer.

VIDEO CASSETTES

- The GR-C7E employs only compact video cassettes carrying the VHS C mark.
- Recording onto prerecorded tapes automatically erases the previously recorded video and audio signals.
- An inverted cassette cannot be inserted.
- Do not load and unload the cassette repeatedly without allowing the tape to run at all. This will slacken the tape and thereby damage it.
- Make certain before loading the cassette that the tape is not slackened. If there is any slack, turn the gear on the cassette in the direction of the arrow to take up slack.
- The cassette is equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording is impossible. If you wish to record on a cassette whose tab has been removed, use adhesive tape to reseal the slot.
- To avoid excessive exposure to dust and fingerprints, do not open the front tape cover.

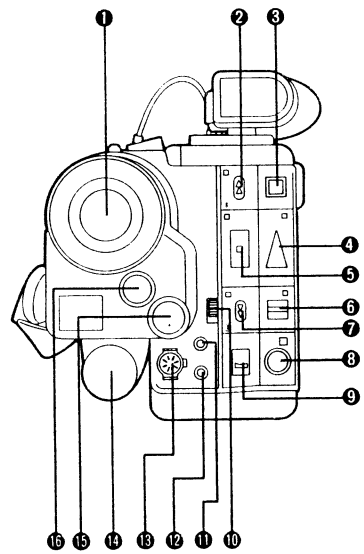


Storage of cassettes

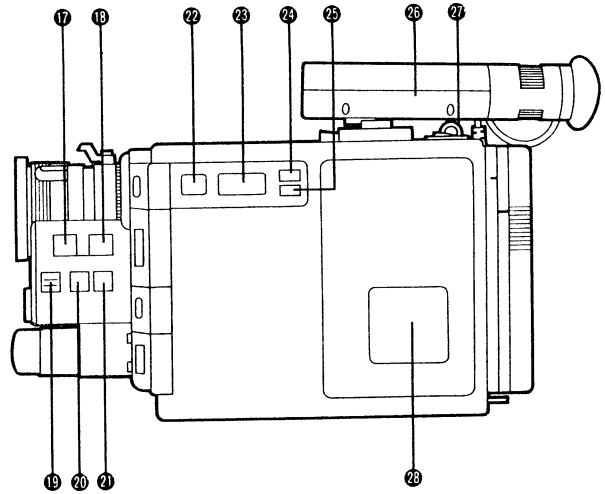
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid storing the cassettes in humid or dusty places.
- Do not drop the cassettes. Do not expose them to violent vibrations or shocks.
- Do not expose the cassettes to strong magnetic fields (near a motor, transformer or magnet).
- Place the cassettes in cassette cases and position them vertically.

CONTROLS AND CONNECTORS

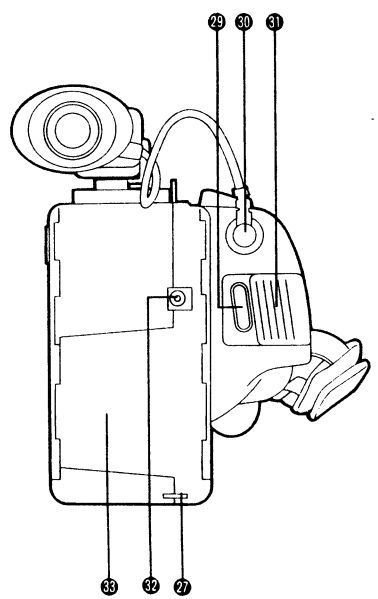
Front view



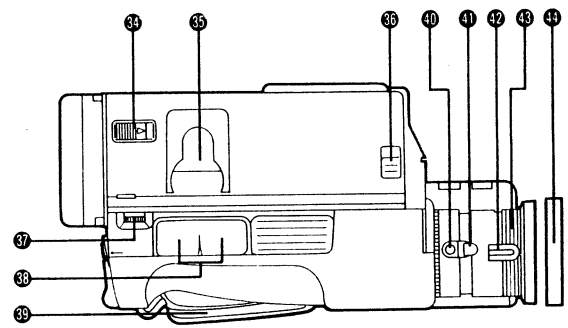
Left side



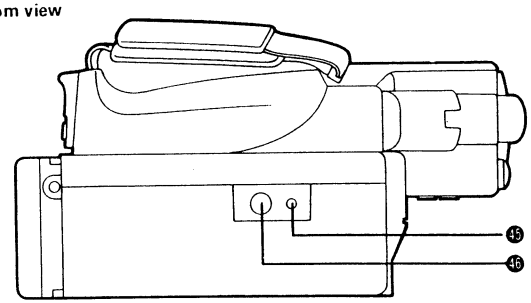
Rear view



Top view



Bottom view



❶ **6: 1 zoom lens**
F 1.6, f = 9 – 54 mm. Filter diameter: 49 mm.

❷ **FF/SHUTTLE SEARCH button with LED indicator**
Pressing this button in the Stop mode fast forwards the tape; pressing it in the Play mode allows fast playback (three times normal speed in SP mode, seven times normal speed in LP mode).

❸ **MONITOR button**
Push this button when you wish to rehearse shots before actually recording them. This function allows you to view the scene on the viewfinder without recording it. Push the STOP button to release this function.

❹ **PLAY button with LED indicator**
Press to start playback.

❺ **STOP button with LED indicator**
Press to engage the Stop mode.

❻ **PAUSE/STILL button with LED indicator**
Press to view a still picture during playback.

❼ **REW/SHUTTLE SEARCH button with LED indicator**
Pressing this button in the Stop mode rewinds the tape; pressing it in the Play mode allows fast playback in reverse (three times normal speed in SP mode, seven times normal speed in LP mode).

❽ **REC STBY button with LED indicator**
Press to engage the Recording Standby mode in which both the REC STBY and PAUSE/STILL LED indicators light. To start recording, press the recording start/stop button ㉙. While recording, the REC STBY LED indicator is blinking.

❾ **POWER switch**
Press to turn power on. The STOP LED indicator will light. Press again to switch off power.

❿ **SP/LP recording mode select switch**
Set to SP to record at standard tape speed. Set to LP to record at a slower tape speed, allowing an extended recording time of up to one hour with a single cassette.

⓫ **Earphone jack (PHONE)**

⓬ **REMOTE control jack**
For connection of the optional RM-P1U pause remote control unit.

⓭ **AV OUT connector**
Both audio and video signals are available from this connector.
To dub from this unit, connect the A/V input connectors of a second recorder to this connector, using the provided dubbing cable.
For playback with a TV, connect the RF-P1E RF unit (provided) to this connector and to the TV.

⓮ **Exclusive microphone**
Omnidirectional condenser microphone for simultaneous sound recording. It can be replaced with other microphones.

⓯ **White balance sensor window**
Allows light to enter for white balance adjustment.

⓰ **Auto-focus sensor window**
Allows light to enter for measuring the camera-to-subject distance.

⓱ **FADER button**
Press this button once to fade out the picture to a white blank screen. For fading in, first press it twice to engage the fade-in standby mode and, after starting recording, press the button where fade-in is to begin.

⓲ **BLC button**
Iris control is always automatic. For backlight compensation, press this button. While it is being pressed, the iris is 1 – 2 f-stops wider than that adjusted automatically.

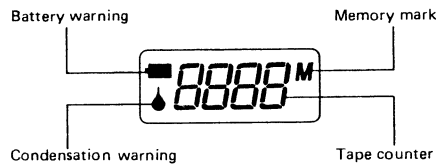
⓳ **FULL AUTO button**
Pressing this button puts the focus and white balance under automatic control. Auto-focus can be cancelled by pressing the FOCUS button; auto-white balance can be cancelled by pressing the filter button. Pressing the FULL AUTO button in the full-auto mode has no effect.

⓴ **Filter select button**
Select the filter position depending on the source of light if the auto-white mode is not used.
☀ : under a halogen or tungsten lamp.
☀ : under daylight.
The filter position is changed each time this button is pressed. Check on the viewfinder screen.

㉑ **FOCUS select button**
Switch to AUTO for automatic focus, and switch to MANUAL to focus manually. Check on the viewfinder screen. The focus mode is reversed each time this button is pressed. The auto-focus mode can also be selected (together with the auto-white mode) by pushing the FULL AUTO button.

㉒ **EJECT button**
To open the cassette holder.

㉓ **Counter display**



Tape counter: Shows from "0" to "9999".
Memory mark: Appears when the MEMORY button ㉕ is pressed.
Battery warning: Flashes when the battery power becomes insufficient for normal operation.
Condensation warning: Appears when excessive condensation occurs inside the unit.

㉔ **RESET button**
Press to reset the counter to "0".

㉕ **MEMORY button**
Press this button at a point on the tape you want to locate later after resetting the tape counter to "0", and the tape will stop automatically at the counter reading of around "0" during rewind or fast forward.

㉖ **Electronic viewfinder**
For monitoring the scene being shot or the playback picture after recording. Several indicators are included.

㉗ **Eyelets for shoulder strap**

㉘ **Cassette holder**
Insert a VHS-C video cassette for recording or playback.

㉙ **Recording start/stop button**
Press this button in the Recording Standby mode (with the REC STBY button pressed) to start recording. Pressing it again re-engages the Recording Standby mode.

㉚ **Viewfinder cable connector (VF)**
Connect the viewfinder cable.

㉛ **Finger rest**
Place your thumb on this grooved area next to the start/stop switch between Start/Stop operations.

㉜ **DC INPUT terminal**
For connection of the provided AA-V2EG AC power adapter/battery charger, optional BH-V5E car battery charger or AP-P1E car battery cord for DC power supply.

㉝ **Battery pack mounting position**

㉞ **Battery pack release button**
Slide in the direction of the arrow to detach the battery pack.

㉟ **Viewfinder mount**
Attach the provided viewfinder.

㊱ **QUICK REVIEW button**
If you want to review the end of the recorded segment for confirmation, press this button from the Record-Pause mode; the tape will be rewound for about 2 seconds of programme time and played back automatically for this section, after which it will stop in the Record-Pause mode in standby for the next shot.

㊲ **TRACKING control**
Minimises noise bars, if observed, during playback.

㊳ **Power zoom buttons**
For automatic zooming; "T" for telephoto and "W" for wide-angle.

㊴ **Grip strap**
Secures the operator's hand to the hand grip.

㊵ **Macro button**
Turn the zoom ring while pressing this button for macro shooting.

㊶ **Manual zoom lever**
Use to turn the zoom ring manually.

㊷ **Manual focus lever**
Use to turn the focus ring manually.

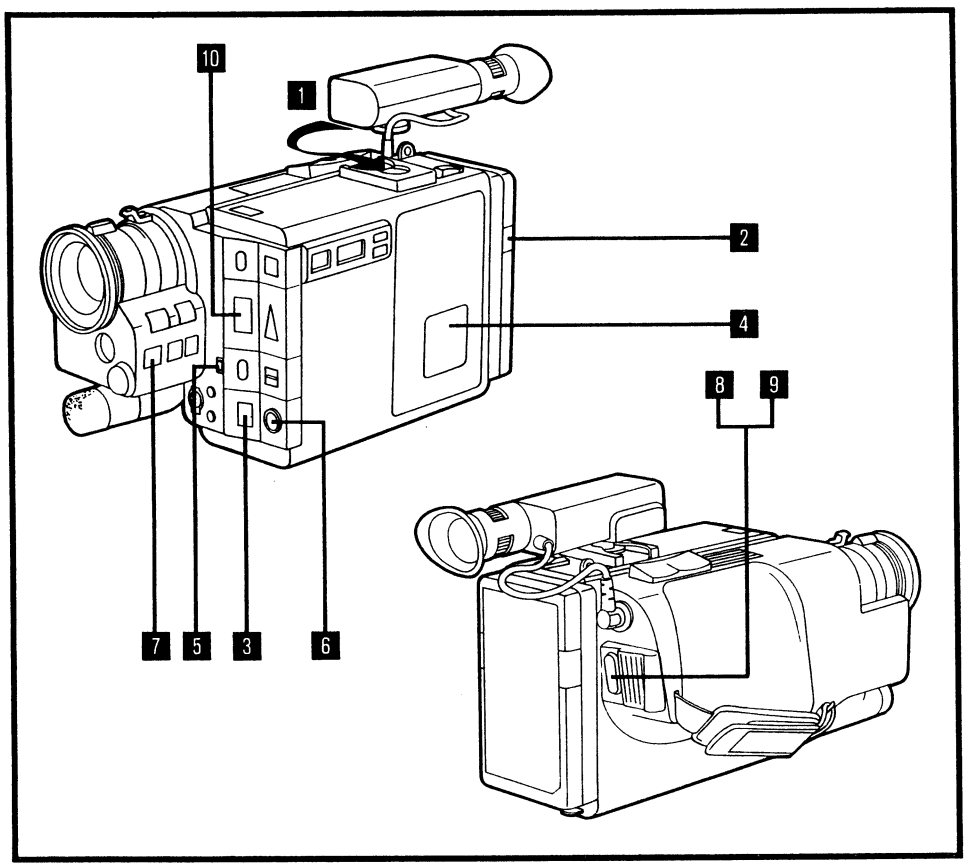
㊸ **Focus ring**

㊹ **Lens cap**
Cap the lens when not in use.

㊺ **Stud hole**

㊻ **Tripod mounting socket**

LIVE RECORDING HAS NEVER BEEN SO EASY



Full-auto outdoor recording procedure

1. Mount the viewfinder. (Refer to page 10 for details.)
2. Attach the battery pack. (Refer to page 12 for details.)
3. Press POWER switch.
4. Pop in a cassette. (Refer to page 13 for details.)
5. Set tape speed to SP or LP.
6. Press REC STBY button.
7. Press FULL AUTO button.
8. Shoot (push start/stop button).
9. Stop recording (push start/stop button).
10. To end recording, press STOP button.
    - To play back the recorded tape, press REW button and then PLAY.

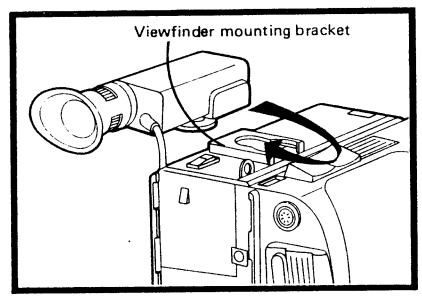
BASIC PREPARATIONS

Mounting the Viewfinder

Switch off power before mounting or removing viewfinder.

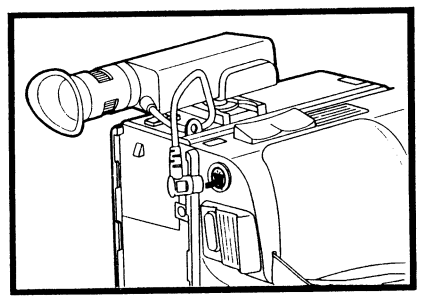
Mounting the viewfinder

1



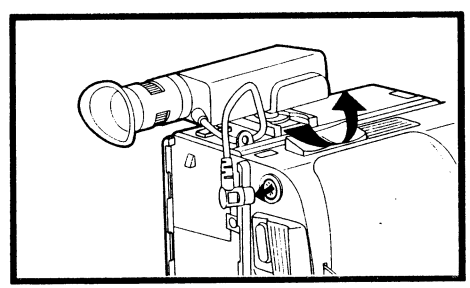
Align the viewfinder's coupling fixture alongside the mounting bracket on the body and slide the fixture into the bracket while pressing down.

2



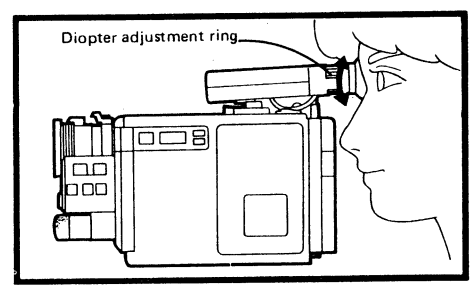
Connect the viewfinder cable to the viewfinder cable connector (VF).

Removing the viewfinder



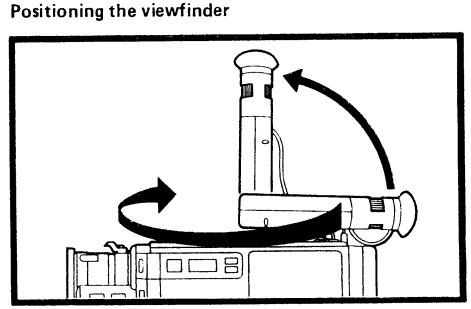
Pull out the viewfinder cable and slide the viewfinder out of the bracket while applying downward pressure.

Diopter adjustment



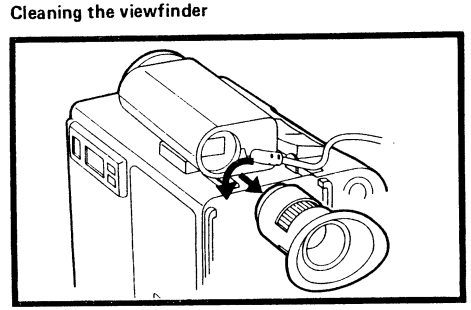
The viewfinder lens can be adjusted to suit the operator's eyesight by rotating the diopter adjustment ring.

Positioning the viewfinder



The viewfinder can be positioned for best viewability. It can be rotated 360° and tilted up 90°, making almost any viewing angle possible.

Cleaning the viewfinder

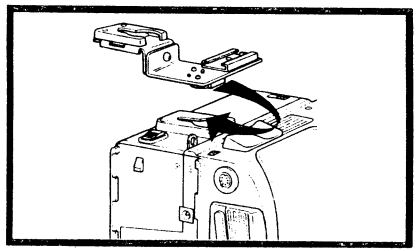


The viewfinder eyepiece can be removed for cleaning. Turn the eyepiece counterclockwise and pull it out.

Attaching the Shoe Adapter

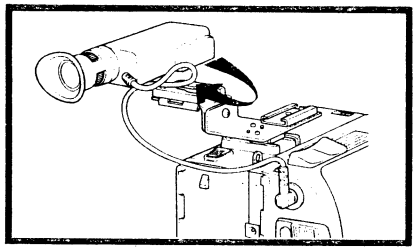
Use this adapter to re-position the viewfinder for left-eye viewing, or for additionally attaching the character generator or an external mike.

1



To attach the shoe adapter, remove the viewfinder and slide the adapter into the bracket usually used for the viewfinder.

2



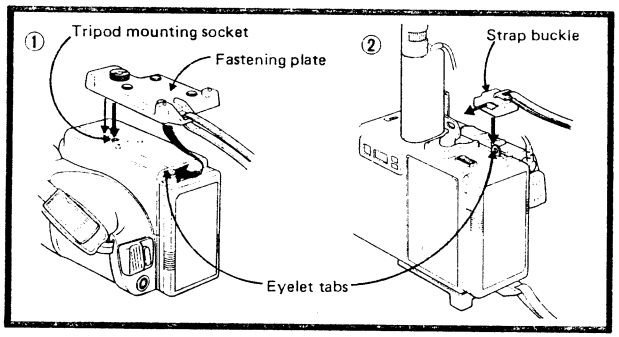
To position the viewfinder for left-eye viewing, slide it into the shoe that is farthest from the camera body.

CAUTION

- Do not attach a video light, otherwise its heat could cause malfunctioning of the GR-C7E.

3 Use the other shoe for an additional item.

Attaching the Shoulder Strap



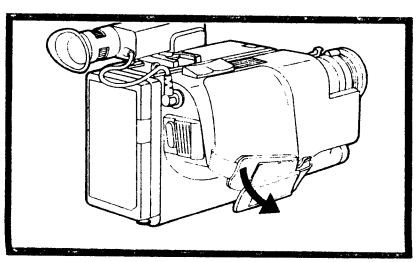
Attaching the Shoulder Strap

① Slide the strap's fastening plate onto the eyelet tab on the camera body's rear, bottom edge, inserting the tab into the slot in the strap ring. Align the large screw over the tripod mounting socket and screw it in, turning clockwise.

② Swing the viewfinder up to the perpendicular position. Slide the buckle at the other end of the strap onto the eyelet tab on the top edge of the GR-C7E while drawing back the spring-loaded locking pin.

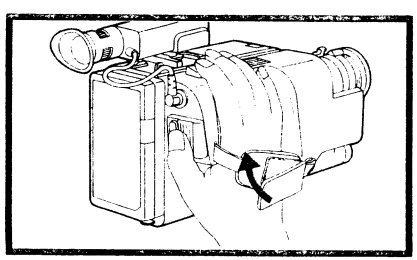
Adjusting the Grip Strap

1



Separate the Velcro strip to expand the loop.

2



Pass your right hand through the loop and grasp the lens grip. Adjust the length of the strap to suit your hand size and refasten the Velcro strip.

POWER SUPPLY SYSTEM

The convenient 3-way power supply system gives you a choice of the most appropriate power supply unit, depending on the application.

CAUTION

- No function is available without power supply.
- Do not use any power supply other than specified.
- Never attempt to use these power supply units with any equipment other than the VideoMovie.

Where AC power is not available

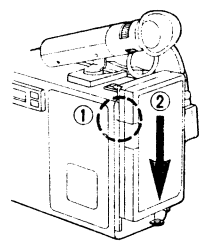
Use the battery packs:

- NB-P5U (Regular)
- NB-P6U (Medium-capacity)
- NB-P7U (High-capacity)
- NB-P8U (Super high-capacity)

To attach

① Align the marks.

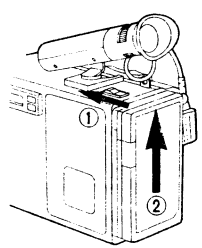
② Slide the battery pack in the direction of the arrow until it locks.



To remove

① Slide the battery pack release button.

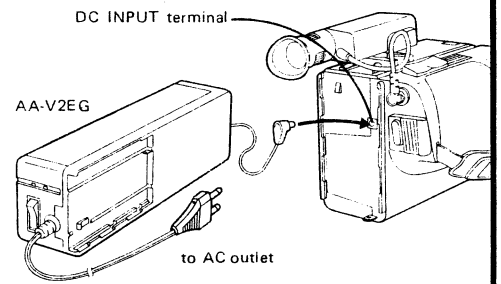
② Remove the battery pack by sliding it in the direction of the arrow.



- Remove the battery pack when not in use.
- For charging the battery packs refer to page 29.

With AC power

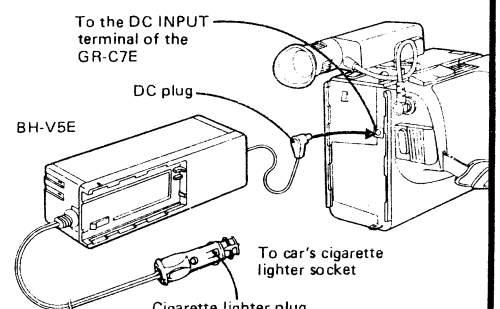
Use the provided AA-V2EG AC power adapter/battery charger.

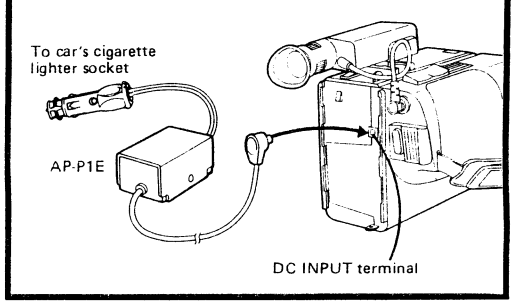


In a car

Use the optional AP-P1E car battery cord or BH-V5E car battery charger.

- Leave the car's engine idling when using the car battery. (For use with 12-V negative-grounded cars only.)

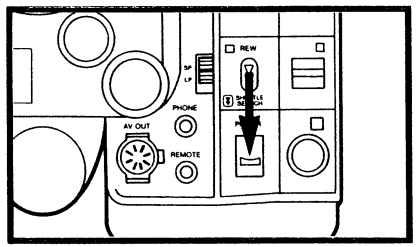




LOADING AND UNLOADING A VIDEO CASSETTE

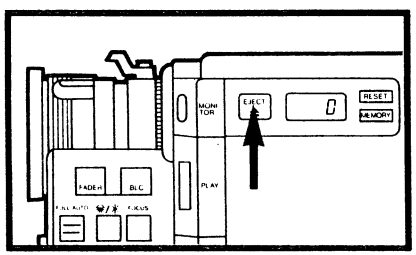
LOADING

1



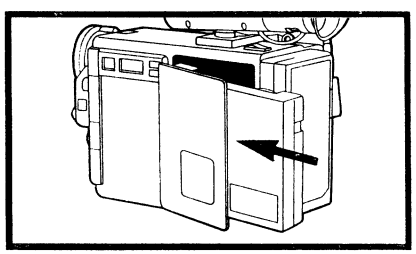
Press the POWER switch to turn power on.

2



Open the cassette holder by pressing the EJECT button.

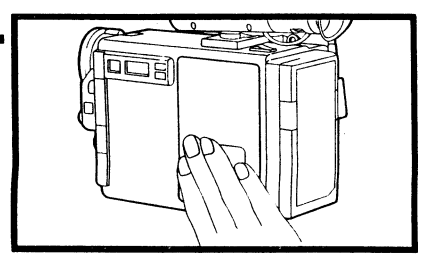
3



Insert the cassette with its printed arrow facing outward.

> First remove tape slack, then insert the cassette correctly. See page 5.

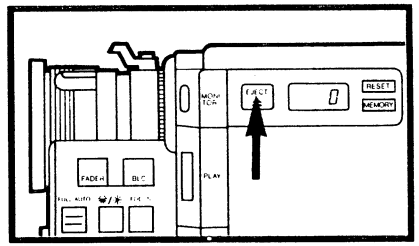
4



Close the cassette holder by pushing its centre area.

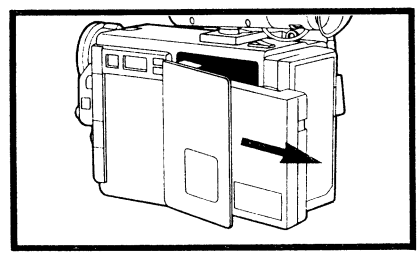
UNLOADING

1



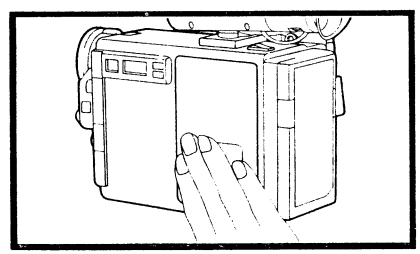
Make sure the unit is in the Stop mode. Press the EJECT button. The cassette holder will open.

2



Remove the cassette.

3



Close the cassette holder by pushing its center area.

- When not in use, switch off power.

Notes:

- Do not repeat loading and unloading of the cassette without running the tape, as this will slacken the tape, causing tape damage.
- When the battery is discharged, the tape is unloaded and the power turns off. However, pressing the POWER switch while holding the EJECT button pressed, turns the power on and ejects the cassette.

VIEWFINDER INDICATIONS

The viewfinder of the GR-C7E provides comprehensive on-screen indications. During recording or rehearsal, you can refer to adjustment aids or warnings.

Recorder status indications

Recording standby mode	— LP —	Small bar in upper right corner of the screen shows unit in the pause mode or the rehearsal mode (with or without cassette).
Recording mode	REC LP REC	When the start/stop switch is pressed from the pause mode, REC or LP REC indicates that tape is running properly.

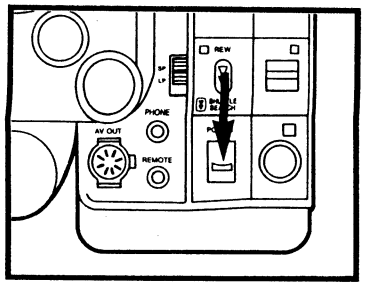
Camera status indications

Filter switch setting (Manual mode)	☀		Indicates that outdoor filter is in use.
	☀		Indicates that indoor filter position is in use.
Manual focus	▶	Focus behind subject	▶ : turn focus ring clockwise until ■ appears. ■ : indicates aimed-at subject is in focus. ◀ : turn focus ring counterclockwise until ■ appears. • Auto-focus mode is indicated by none of these appearing on the screen.
	■	Correct focus	
	◀	Focus in front of subject	

Warnings

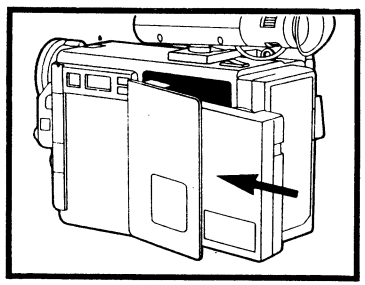
Tape-end warning	REC — Blinking	When time for remaining tape reaches a few minutes, "REC" begins blinking.
Battery warning	BATTERY — Blinking	When battery power becomes insufficient for normal operation, "BATTERY" appears and blinks.
Low-light warning	LIGHT — Blinking	When amount of light is insufficient, "LIGHT" appears and blinks.
Low-contrast warning	▶ ■ ◀ — Blinking	If focus detection is difficult because of low contrast, these focus-aid indicators appear simultaneously and blink.

1



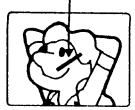
Press the POWER switch to ON.

2



Insert a video cassette correctly (with its safety tab in place).

Precautions for auto-focus

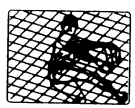
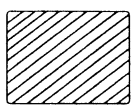
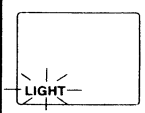
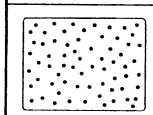
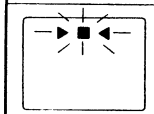


- A small area around the centre of the picture, which varies depending on the zoom and focus conditions, is used to detect focus. (No actual indication provided on the screen.)

CAUTION

- Do not touch the focus ring while the auto-focus mechanism is in operation.
- When not in use, do not leave the GR-C7E in the Auto-focus mode with power on; otherwise light entering the auto-focus sensor window will operate the auto-focus mechanism, consuming power.

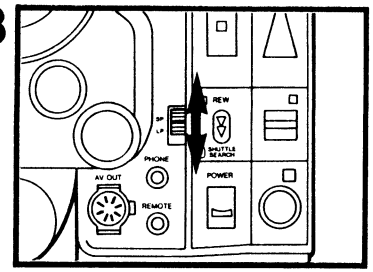
Correct focus may not be obtained in the following situations. In such cases manual focusing should be performed to obtain proper focus.

	Two subjects at different distances overlap in the same scene.
	Slanted lines only.
	Low illumination where the under-exposure indicator appears on the viewfinder screen.
	Minute patterns or identical patterns that are regularly repeated.
	Low contrast subjects for which the low-contrast indicator appears, such as a smooth, single-colour wall or the blue sky.

Note:

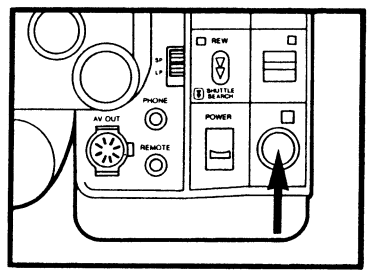
- If the lens and/or auto-focus sensor window are smeared with stains or blurred with condensation, accurate focusing is not possible. Keep them clean. If they become dirty, wipe with a piece of soft cloth. When condensation occurs, dry them by wiping with a soft cloth or wait for conditions in which they become dry.

3

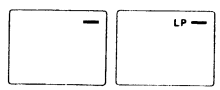


Set the tape speed to SP or LP.

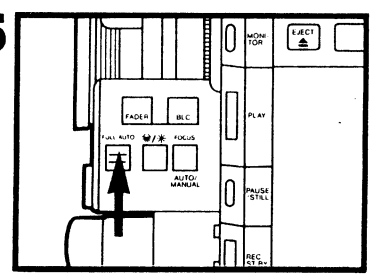
4



Press the REC STBY button. The unit enters the Recording Standby mode (with the REC STBY and PAUSE LED indicators lighting).
Check the viewfinder indications. See page 14.



5



For full-auto operation, press the FULL AUTO button.

For manual override, use the filter and FOCUS buttons.

- Press the filter button so that the required symbol appears on the viewfinder.
  - ☀: when the subject is illuminated by a halogen or tungsten lamp.
  - ☀: when you shoot in the daytime outdoors.
- For manual focus, press the FOCUS button to MANUAL. A focus-aid indicator will appear on the viewfinder.

One-hour recording

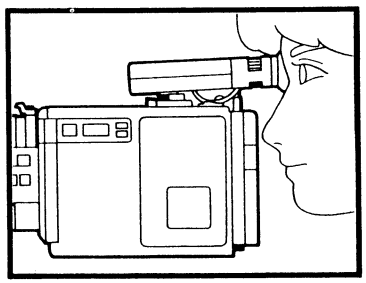
- To record longer on a single cassette, use the LP (Long Play) mode.
- For LP recording, a higher-capacity battery pack may be used.
- SP: 30 minutes
  LP: 60 minutes

Auto or manual?

- Iris control is always automatic. Therefore, possible combinations of auto and manual functions are as follows:

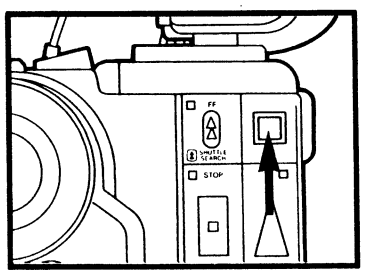
Control / Function	FULL AUTO	☀/☀	FOCUS	FOCUS ☀/☀
White balance	Auto	Manual	Auto	Manual
Focus	Auto	Auto	Manual	Manual
Iris	Auto	Auto	Auto	Auto

6



Determine the focus and composition by referring to the viewfinder image. For zooming, see page 22.

Rehearsal



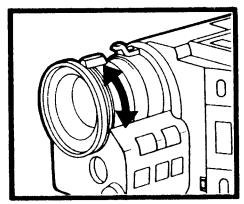
If you wish to rehearse shooting angles, compose scenes, etc., without actually recording on the tape, press the MONITOR button, instead of REC STBY. The aimed-at scene will appear on the viewfinder screen. For full-auto rehearsal, also press the FULL AUTO button. To engage the Recording Standby mode from rehearsal, press the REC STBY button. To only disengage the Rehearsal mode, press the STOP button.

- Rehearsal is possible whether a cassette is loaded or not.
- With a cassette loaded, rehearsal is not possible during rewind or fast forward.
- The power save circuit does not function during rehearsal. (For power save function, see page 20.)

Manual focus

If the manual focus mode is selected, proceed as follows:

①Zoom in on a subject by pressing the "T" button.
②Focus onto it by turning the focus ring.
③Determine the composition by pressing the "W" button.



Note:

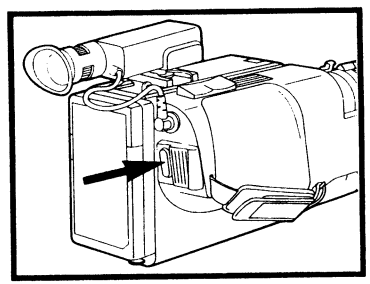
- When you use the manual focus mode, be sure to focus the lens in the maximum telephoto position. If you focus in on a certain subject in the wide-angle position, sharply-focused images cannot be obtained when zoomed up because the depth of field is reduced at longer focal lengths.

FOCUS INDICATORS

The focus indicators on the viewfinder screen function in the manual focus mode.

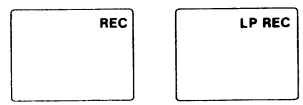
Condition	Indication	Corrective operation
Focus point behind the subject	▶	Turn the focus ring clockwise until the centre square lights.
Correct focus	■	Keep the focus ring in the same position.
Focus point in front of the subject	◀	Turn the focus ring counterclockwise until the centre square lights.
Indication not possible because of low contrast	▶■◀	Estimate the subject distance and set the focus ring referring to the distance scale on it.

7

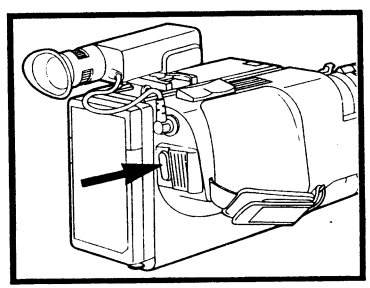


Press the start/stop button.

- This causes REC or LP REC on the viewfinder screen to appear, showing that recording is actually taking place.



8



To stop recording temporarily, press the start/stop button once again.

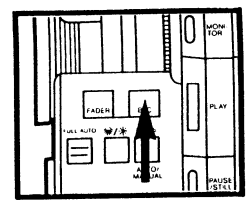
9

To restart recording, press the start/stop button.

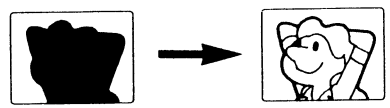
- For a pause longer than 5 minutes, press the POWER switch to OFF.
- If the Recording Standby mode continues for longer than about 5 minutes, the unit switches itself off automatically. To restart recording, turn the power on. This makes clean assembled recordings possible even after a long pause.

Backlight compensation

- Press the BLC button. While it is being pressed, the iris is 1 – 2 f-stops wider than that adjusted automatically.



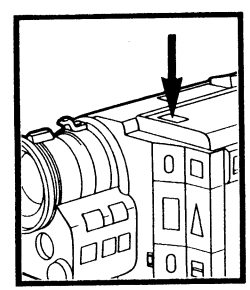
When excessive lighting is located in back of the subject, correct exposure may not be obtainable. To compensate for this, use BLC.



Without BLC | With BLC

Quick Review function

- If you want to review the end of the last recording for confirmation, press the QUICK REVIEW button from the Record-Pause mode; the tape will be rewound for about 2 seconds of programme time and played back automatically for this section, after which it will stop in the Record-Pause mode in standby for the next shot.



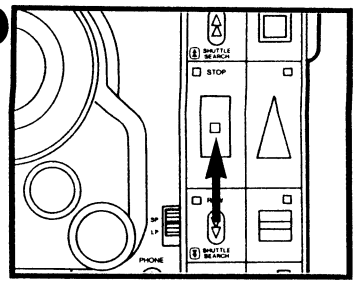
Notes:

- The TRACKING control should be at its centre position.
- Distortion might occur when playback starts. This is normal.

Assemble recordings

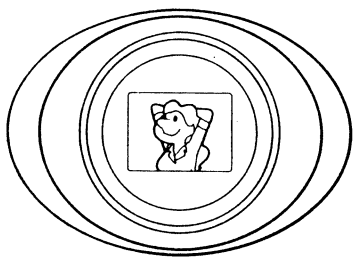
- Repeating steps 8 and 9 produces assemble recordings. In playback, the picture may be slightly distorted at the point between separate takes. This is not due to any defect of the unit.
- If recording is restarted from the Stop mode, a few frames of the previously recorded picture is replaced with a new recording. To avoid this, follow the technique described in "Assemble Recording Technique-2" on page 20.

10



To end recording, press the STOP button.
- After making sure that the tape has stopped, press the POWER switch to OFF.

Viewfinder Monitoring

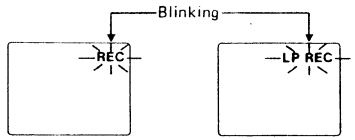


- Rewind the tape to a point from which you want to check the recording.
- Press the PLAY button, and you can view the playback picture on the viewfinder screen.

Notes:
- Pressing the PAUSE/STILL button during playback stops the picture on the viewfinder screen.
- Shuttle search is also possible in both directions.

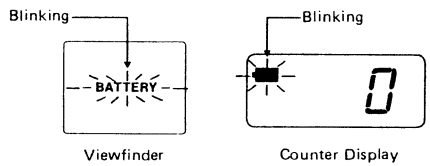
Warnings

Tape-end warning



- "REC" or "LP REC" on the viewfinder screen blinks faster a few minutes before the end of the tape.
- When the end of the tape is reached during recording, the Stop mode engages automatically.

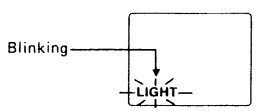
Battery warning



Viewfinder Counter Display

- When the battery power is coming to an end, a battery warning indication appears both in the viewfinder and the counter display. Replace the battery pack with a fully charged one.
- After these indications appear, the power turns off automatically. In this state, however, pressing the POWER switch while holding EJECT button pressed, turns the power on and ejects the cassette.

Low-light warning



- If the blinking "LIGHT" indicator appears on the viewfinder screen, the amount of light is insufficient. Increase the lighting.

POWER SAVE AND TAPE PROTECTION CIRCUIT

- To save battery power, the GR-C7E (when battery-operated) switches itself off automatically when left for longer than 5 minutes in the Stop mode.
- To protect the tape, the GR-C7E (regardless of whether battery-operated or AC-powered) releases tape tension slightly and switches itself off automatically if left for longer than 5 minutes in the Recording Standby (Record-Pause) mode.
- For the same reason, the GR-C7E enters the Stop mode and switches itself off automatically if left for longer than 5 minutes in the Still (Play-Pause) mode.

Battery operation

STOP → POWER OFF
5 minutes

Battery/AC operation

REC PAUSE → POWER OFF
5 minutes

PLAY PAUSE (STILL) → STOP → POWER OFF
5 minutes

ASSEMBLE RECORDING TECHNIQUE — 1 (To replace the battery pack during recording)

1 If the battery warning appears in the viewfinder or the counter display while recording, stop recording by pressing the POWER switch to OFF, not the STOP button.

2 Replace the battery pack with a charged one.

3 Press the POWER switch to ON.
- The unit will be in the Recording Standby mode.

4 Press the recording start/stop button to start recording.

ASSEMBLE RECORDING TECHNIQUE — 2 (To record onto a partially recorded tape)

1 Play back the tape to a point where you wish a new recording to start.
- Use the SHUTTLE SEARCH button for faster location.

2 Press the PAUSE/STILL buttton at the located point.
- The unit will enter the Still mode.

3 Press the REC STBY button.
- The unit will enter the Recording Standby mode.

4 Press the recording start/stop button to start recording.

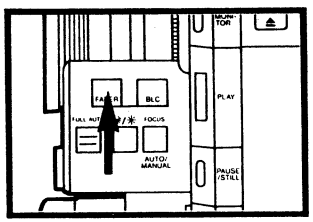
SPECIAL TECHNIQUES

Fade-in/out

The GR-C7E is equipped with an automatic fade mechanism for allowing smooth fade-in and fade-out with a white-coloured blank screen. Audio also fades with video.

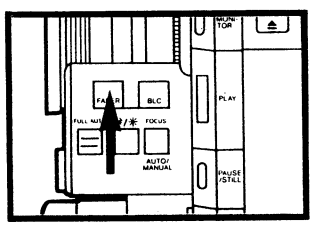
Automatic fade-in

1



Determine the composition in the Recording Standby mode and press the FADER button twice to set the fade-in standby mode. The screen will become white quickly.

2



Press the start/stop button and press the FADER button. Fade-in will start and be completed in about 3 seconds.

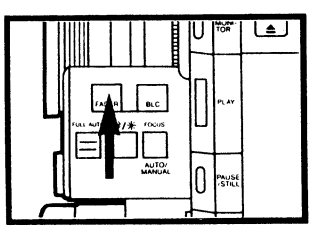
> **NOTE**
> - If you want to delay the start of fade-in, press the start/stop button and, after a desired time has elapsed, press the FADER button.

Fade-in →

← Fade-out

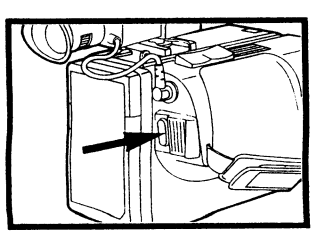
1 **Automatic fade-out**
Start shooting as usual.

2



Press the FADER button where you want fade-out to start. The fade-out will be completed in about 3 seconds.

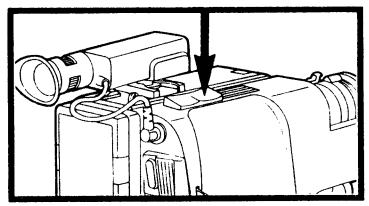
3

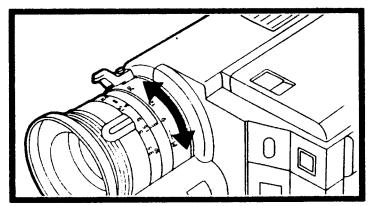


Stop shooting by pressing the start/stop button after fade-out has been completed.

Zooming

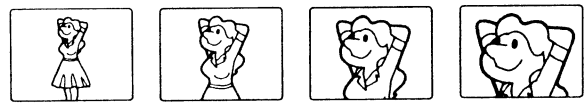
When the focal length of the lens is varied by turning the zoom ring, the image appears to come nearer to or retreat from the viewer.





Power zooming
Press "T" for zooming in and "W" for zooming out.

Zoom in →

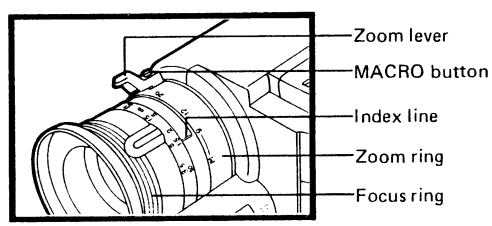


← Zoom out

Manual zooming
Rotate the zoom lever downwards for zooming in and upwards for zooming out.

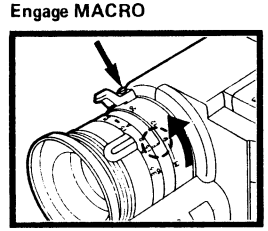
Macro Shots

Normally, focusing is possible only for subjects that are more than 1 m away from the camera. By setting the lens to the Macro mode, it is possible to manually focus in on any subject located inside that limit, right up to the front of the lens. The MACRO and ZOOM ranges combined give continuous shooting ability from close-up to infinity.



Engage MACRO

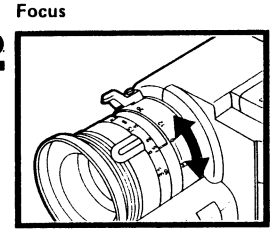
1



While pressing in the macro button, turn the zoom ring in the direction of the arrow until the number "9" on the zoom ring passes the index line.

Focus

2

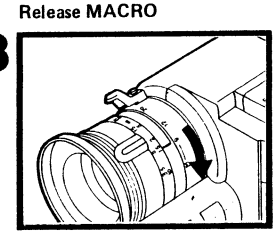


Focus by turning the zoom ring slowly.

- Use the zoom ring to focus in the MACRO range.
- Turning the focus ring will slightly alter the angle of view of the lens.
- The zoom and auto-focus mechanisms do not function during macro shooting.

Release MACRO

3



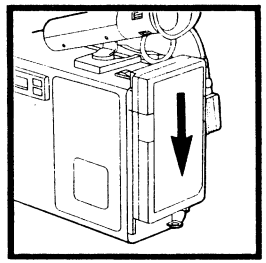
To release the Macro mode, turn the zoom ring in the direction of the arrow until the number "9" passes the index line.

PLAYBACK

The GR-C7E permits playback of recorded VHS-C video cassettes.
For connections refer to pages 25 and 26.

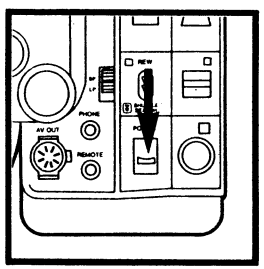
Preparation
- Set the aerial select switch of the RF-P1E RF unit to VIDEO and the TV receiver's channel selector to your video channel (specified AV channel).

1



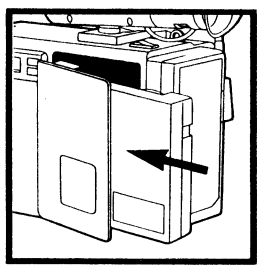
Connect a power supply unit. (Battery or AC operation: see page 12.)

2



Press the POWER switch to ON.

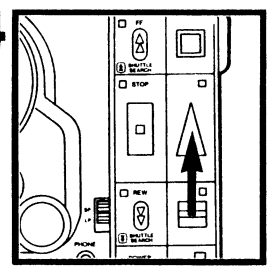
3



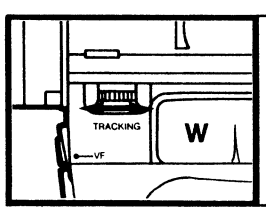
Insert a pre-recorded cassette.

First remove tape slack, then insert the cassette correctly. See page 5.

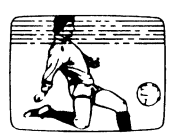
4



Press the PLAY button. Playback will start.
- The SP/LP switch may be in either position. The SP or LP mode recording is automatically detected and played back at a correct speed respectively.
- When the end of the tape is reached during playback, the Rewind mode engages automatically.

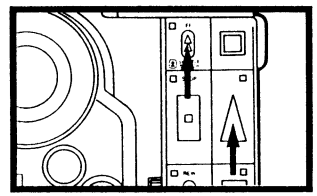


Tracking adjustment
If noise bars appear on the screen, adjust the TRACKING control. Turn it slowly in either direction to minimise noise bars. After playing a particular tape, return the TRACKING control to the centre position.



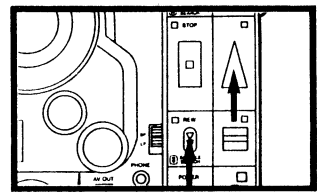
Shuttle Search

Fast-speed playback in the forward direction



Press the FF button in the Play mode. Playback will be speeded up to 3 times normal speed in SP mode, 7 times normal speed in LP mode, as long as the button is being pressed.

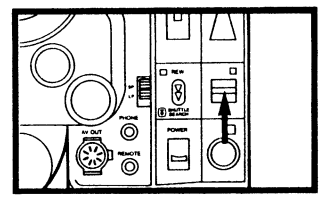
Fast-speed reverse playback



Press the REW button in the Play mode. The tape will be played back in the reverse direction at 3 times normal speed in SP mode, 7 times normal speed in LP mode, as long as the button is being pressed.

Note
- Noise may appear or pictures may become monochrome from time to time during Shuttle Search and still playback. This is not due to any defect of the unit.

Still playback

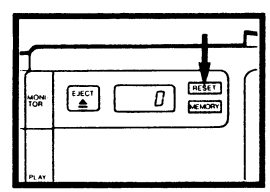


Press the PAUSE/STILL button during playback. The picture will stop on the screen.
- After about 5 minutes of still playback, the unit enters the Stop mode automatically 'for tape protection and switches itself off.

Counter Memory Function

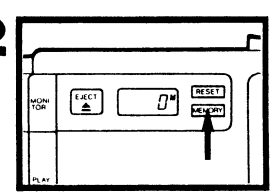
The GR-C7E incorporates a counter memory mechanism which facilitates locating a specific tape segment.

1



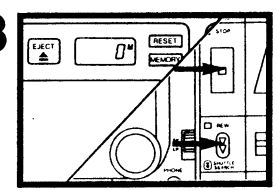
Press the RESET button to reset the counter to "0".

2



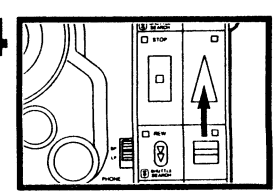
Press the MEMORY button. The "M" mark will appear.

3



After recording or playback, press the STOP button, then the REW button. The tape will automatically stop at the counter reading of around "0".

4

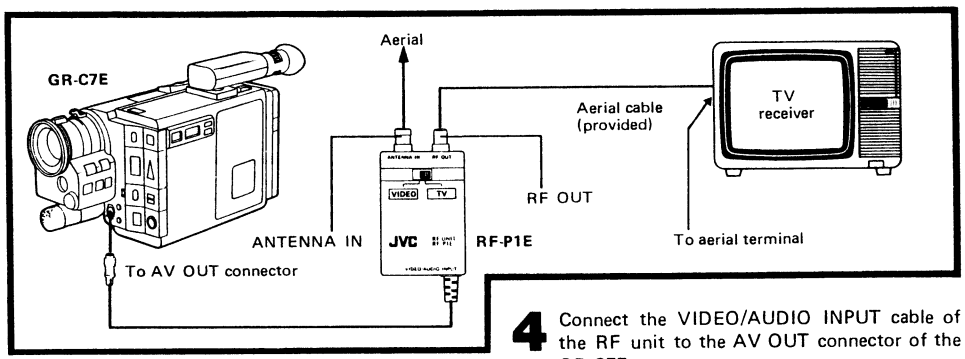


Press the PLAY button to start playback.

Notes:
- The counter memory function is effective in the Fast Forward mode as well.
- To cancel the memory function, press the MEMORY button.
- When the power supply unit is disconnected, all indications on the counter display disappear and the counter memory function is cancelled after about 30 seconds.

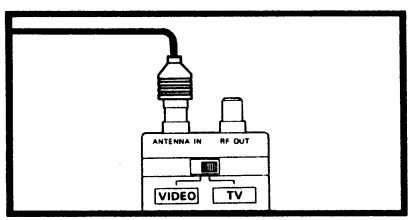
CONNECTION TO A TELEVISION FOR PLAYBACK

The GR-C7E includes playback circuits and allows playback of pre-recorded cassettes simply by connecting to a television set.

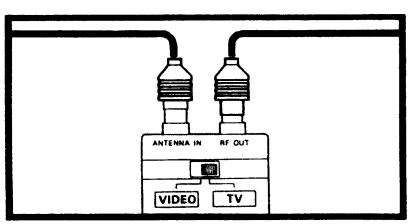


1 Remove the aerial cable from the TV receiver.

2 Connect the aerial cable to the ANTENNA IN terminal of the RF unit.

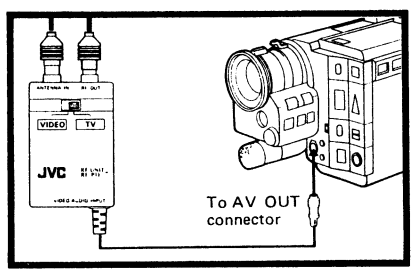


3 Connect the RF OUT terminal of the RF unit to the aerial terminal of the TV receiver using the provided aerial cable.

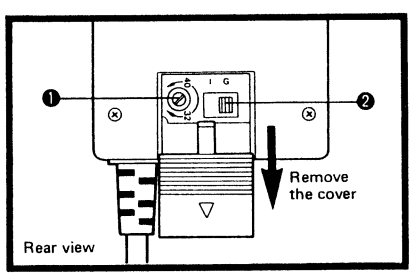


PRECAUTIONS FOR RF-P1E
- For exclusive use with the GR-C7E VideoMovie.
- Do not disassemble or remodel the RF-P1E.
- Do not expose it to strong shocks.
- Unplug the connected equipment during lightning storms. (Never touch the aerial cable.)

4 Connect the VIDEO/AUDIO INPUT cable of the RF unit to the AV OUT connector of the GR-C7E.



5 Adjust the RF converter output channel according to your VIDEO CHANNEL.



❶ RF converter channel adjustment screw

The RF unit permits playback of video and audio recordings through a TV receiver. The signals from the RF unit are viewed through a vacant channel not used for broadcasting in your area. The output frequency of the RF converter has been set to correspond to a broadcast on UHF channel 36. To view playback pictures from the GR-C7E with your TV receiver, tune its specified AV channel to UHF channel 36. If channel 36 is employed for broadcasting in your area, readjust the RF converter output channel to one of the vacant channels between 32 and 40.

1. Set the AV channel of the TV receiver to one of the vacant channels.
2. Power the GR-C7E.
3. Put the GR-C7E in the Rehearsal mode (see page 17).
4. Set the VIDEO/TV switch of the RF unit to VIDEO.
5. While monitoring the output signal on the TV screen, turn the RF converter channel adjustment screw ❶ so that the monitored picture comes in most clearly.

- When you wish to view video cassette programmes, always select the AV channel on the TV receiver which has been tuned to the output frequency of the RF converter.

❷ TV system select switch (I/G)

When you use a TV receiver built to the British PAL standard, shift the system select switch ❷ to "I".

CAUTION:
To view the GR-C7E recordings with a TV receiver, use a TV receiver having a specified AV channel and employ this AV channel as your VIDEO CHANNEL, otherwise playback may be disturbed with vibrating or bending pictures. AV channels refer to channels exclusively for video playback; because of AFC circuits applied to these channels, the playback pictures can be stabilised. Recent TV receivers have one or more AV channels.

OPERATION

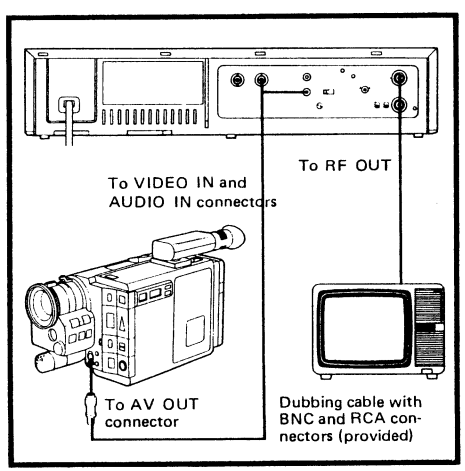
Viewing video cassettes being played back with the GR-C7E

To view video cassettes or to monitor the recording, set the VIDEO/TV switch of the RF unit to VIDEO and the TV channel selector to the channel corresponding to the RF output channel.

Viewing television programmes

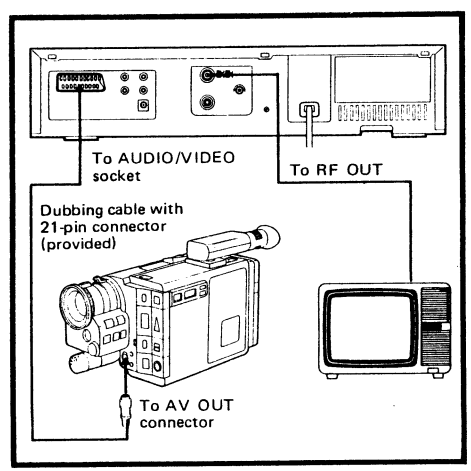
Set the VIDEO/TV switch to TV, and the TV receiver will function as usual.

TAPE DUBBING OR EDITING



Connection

1. Connect the AV OUT connector of the GR-C7E to the AUDIO IN and VIDEO IN connectors of the video recorder using either of the provided dubbing cables, depending on the deck you are using.
2. Connect a television to the video recorder to monitor the picture while dubbing.



Operation

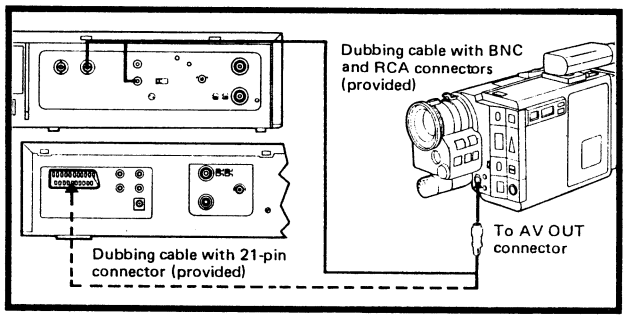
- Put the GR-C7E in the Play mode and the connected recorder in the Record mode to copy the recording. To edit out unwanted material, press the recorder's PAUSE button.

USING THE GR-C7E AS A VIDEO CAMERA

For continuous documentation of longer events, the GR-C7E can be used as an independent video camera in combination with either a deck-type or portable video recorder.

Using a recorder not equipped with a 10-pin camera connector

●Connect the AV OUT connector of the GR-C7E to the AUDIO IN and VIDEO IN connectors of the video recorder using either of the provided dubbing cables, depending on the deck you are using.



Operation

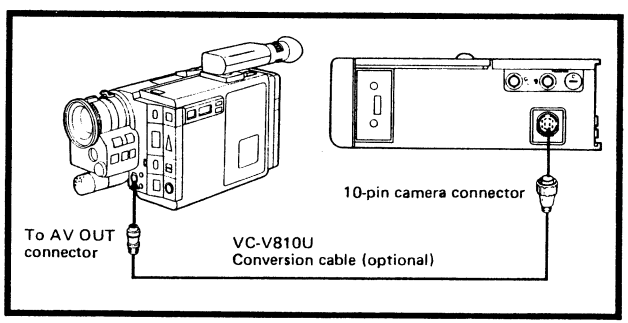
1. Press the MONITOR button. The camera output signal is now available via the dubbing cable.
2. Put the connected recorder in the Record mode. Recording will start. Tape start/stop should be controlled with the recorder's buttons.

Note:

●In this configuration, it is possible to obtain a continuous recording and an edited-out recording of the same event simultaneously, because the GR-C7E's start/stop button only controls the tape inside itself while another tape loaded in the connected recorder continues running. To record on the GR-C7E's tape, follow the same recording procedure as mentioned before. press REC STBY and then the start/stop button.

Using a recorder equipped with a 10-pin camera connector

●Connect the AV OUT connector of the GR-C7E to the 10-pin camera connector of the second recorder using the optional VC-V810U conversion cable.



Operation

1. Press the MONITOR button.
2. Put the connected recorder in the Recording Standby (Record-Pause) mode.
   ●The viewfinder's mode indication corresponds to the state of the connected recorder.
3. Press the start/stop button of the GR-C7E to start recording.

Note:

●To record on the GR-C7E's tape as well, press the REC STBY button and then the start/stop button.

Precautions

●Power is not supplied to the GR-C7E from the connected VCR. Independent power supply is required for both the GR-C7E and the VCR.

●If you stop recording by pressing the GR-C7E's start/stop button, the connected VCR also stops in the Pause mode. However, the pause command signal is not delivered to the connected VCR in the following cases and, therefore, the VCR will start automatically:

(1) when the GR-C7E is switched off or its battery becomes discharged.

(2) when the VC-V810U cable is disconnected.

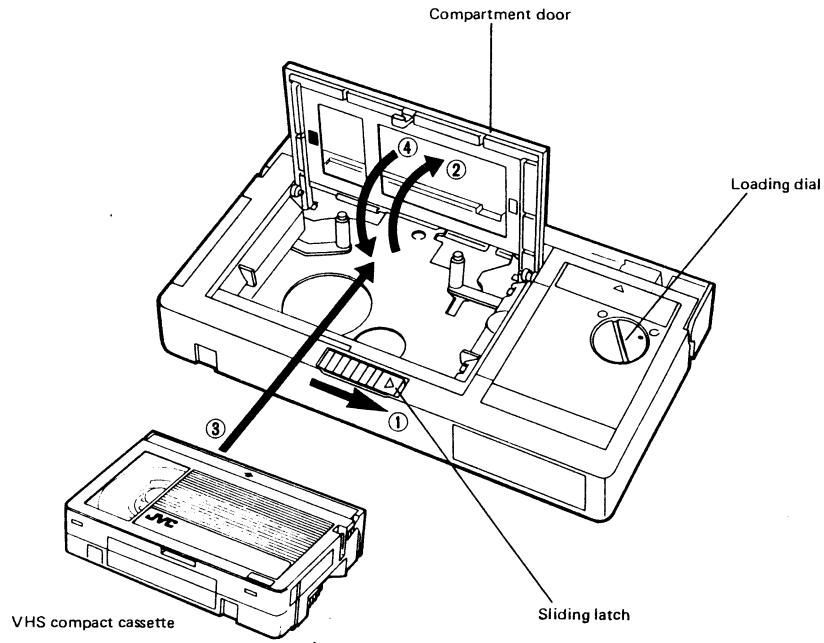
Therefore, before replacing the battery or tape for the GR-C7E, put the connected VCR either in the STOP or REC LOCK mode.

USING THE CASSETTE ADAPTER (provided)

The VHS compact video cassettes recorded with the GR-C7E can be played back with a standard VHS machine by using the provided C-P3U Cassette Adapter.
(A compact video cassette installed in the cassette adapter is fully compatible with a standard VHS machine for both recording and playback.)

●**C-P3U Cassette Adapter**

Being battery-operated, the C-P3U performs tape loading and unloading automatically.



For more details refer to the instruction manual of the C-P3U.

Notes:

●To view compact video cassettes recorded with VideoMovie using a cassette adapter, employ the AV channel of a TV receiver.

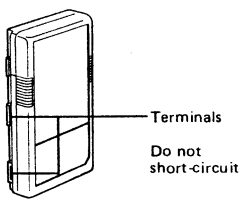
●During special-effects playback (slow motion, still frame, etc.) the picture may vibrate or noise bars may appear on the screen.

CHARGING THE BATTERY PACK

To charge the battery pack, use the exclusive AC power adapter/battery charger AA-V2EG (provided/optional) or car battery charger BH-V5E (optional).

A WORD ON THE EXCLUSIVE NB-P5U/P6U/P7U/P8U BATTERY PACKS

The NB-P5U/P6U/P7U/P8U are nickel-cadmium batteries. Give attention to the following to make the most of their characteristics.



Temperature ranges:
The recharging time is based on room temperature of 20°C.
The lower the temperature, the longer the recharging time.
For charging: 10°C to 35°C
For operating: -10°C to 40°C
For storing: -10°C to 30°C

The battery pack has been kept in the uncharged state for shipment. Therefore, before use, charge it.

- To avoid hazard:
  1. Do not burn.
  2. Do not short circuit the terminals.
  3. Do not modify or disassemble.
  4. Use only specified chargers.
- To prevent damage and prolong service life:
  1. Avoid dropping, unnecessary shocks.
  2. Avoid repeated charging without discharging.
- This unit has a limited service life:
  Near the end of its service life, when it begins to deliver less recording time per charge, purchase a replacement.
- It is normal for the unit to be warm after charging or use.
- This is a chemical reaction type battery; its properties are best maintained under the following conditions:
  1. Optimum charging takes place at temperatures between 10°C and 35°C. Cooler temperatures impede chemical reaction. Warmer temperatures can prevent complete charging.
  2. Store in a cool dry place. Extended exposure to high temperatures will increase natural discharge and shorten service life.
  3. Total natural discharge may occur during long storage periods (uncharged storage is preferable; recharge one day before use).
  4. Remove from charger or powered unit when not in use; some machines use current even when switched off.

PRECAUTIONS FOR AA-V2EG

- If used near a radio, the provided AA-V2EG AC power adapter/battery charger may interfere with reception.
- Prevent inflammables, water and metallic objects from entering the unit.
- Do not disassemble or modify the unit.
- Do not apply shocks to the unit.
- Do not subject the unit to direct sunlight.
- Avoid using the unit in extremely hot or humid places.
- Avoid using the unit in places subject to vibrations.

Recording time for the GR-C7E

NB-P5U 30 min.	NB-P7U 60 min.
NB-P6U 45 min.	NB-P8U 120 min.

- The recording time per charge is influenced by the duration of recording standby, frequency of zooming, etc. It is safer to have spare battery packs.

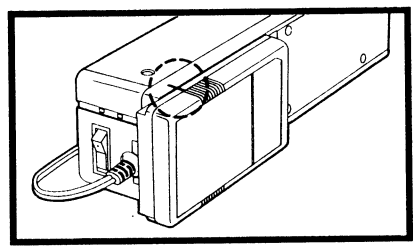
Charging procedure

Charging time

NB-P5U 60 min.	NB-P7U 90 min.
NB-P6U 60 min.	NB-P8U 120 min.

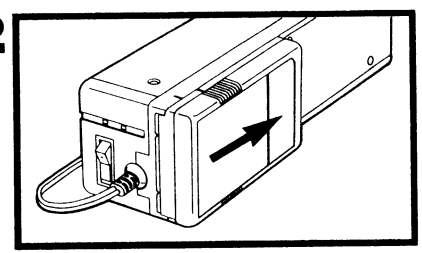
- The charging time differs depending on the ambient temperature and the condition of the battery pack.
- When sliding the battery pack on or off the charger, make sure that the charger's POWER switch is set to OFF.

1



Align the marks.

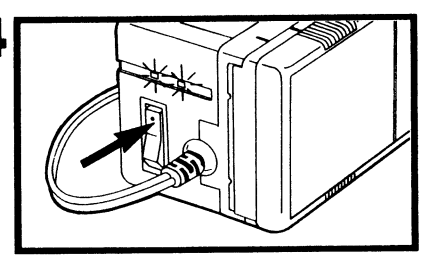
2



Slide the battery pack in the direction of the arrow until it locks in place.

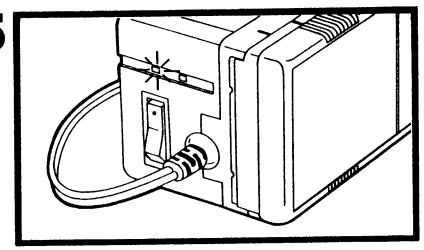
3 Connect the AC power cord to a wall outlet.

4



Press the POWER switch to ON. The POWER indicator will light first, then the CHARGE indicator will light in a few seconds.

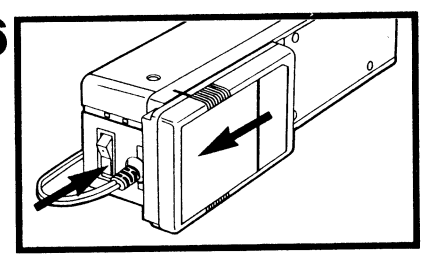
5



When charging is completed, the CHARGE indicator goes out.

CAUTION
- If the POWER button is left in its ON position after the CHARGE indicator goes out, additional charging continues with a small amount of current.
- Faint oscillation may be heard at the start of charging. This is not due to any defect of the unit.

6



Press the POWER switch to OFF.
Remove the battery pack by sliding it off.
- The battery pack becomes warm immediately after being charged. This is not due to any defect of the unit.

Note:
- The optional BH-V5E Car Battery Charger can charge the batteries from a car battery. For details refer to the instructions of the BH-V5E.

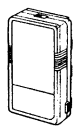
SYSTEMS FLEXIBILITY

For maximum enjoyment, make the most of the provided or optional accessories depending on the situation.
For availability (whether provided or optional) refer to page 36.

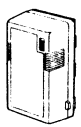
① Regular battery pack NB-P5U
☞ Page 12

② Medium-capacity battery pack NB-P6U
☞ Page 12

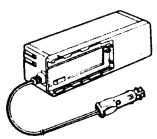
③ High-capacity battery pack NB-P7U
☞ Page 12



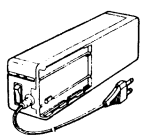
④ Super high-capacity battery pack NB-P8U
☞ Page 12



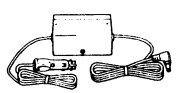
⑤ Car battery charger BH-V5E
☞ Pages 12, 29 and 30
Use to charge the battery pack, or power the GR-C7E using a car battery.



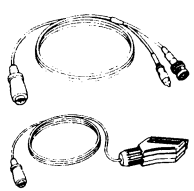
⑥ AC power adapter/battery charger AA-V2EG/EK
☞ Pages 12, 29 and 30
Use to power the GR-C7E with household AC current or charge the battery pack.



⑦ Car battery cord AP-P1E
☞ Page 12
For power supply from a car battery.

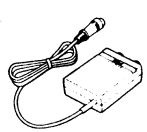


⑧ Dubbing cables
☞ Pages 26 and 27
Use either dubbing cable, depending on the deck you are using to connect the GR-C7E to a second video recorder for dubbing.



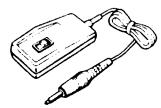
⑨ A/V extension cable VC-P2U
Use to extend the A/V cable.

⑩ RF unit RF-P1E
☞ Pages 25 and 26
Use to connect the GR-C7E to a regular TV receiver for playback.

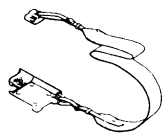


⑪ Conversion cable VC-V810U
☞ Page 27
For connecting the GR-C7E to a VCR with a 10-pin camera connector.

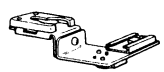
⑫ Remote control unit RM-P1U
☞ Page 33
Controls recording start/stop from a distance.



⑬ Shoulder strap VU-V17U
☞ Page 11
Carry GR-C7E from shoulder in readiness for shooting.

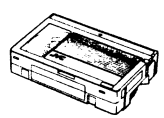


⑭ Shoe adapter
☞ Page 11
Use to attach microphone, character generator, etc.

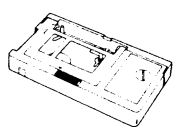


⑮ Character generator CG-P50E
☞ Page 32
Allows superimposition of titles, dates and lap time during recording.

⑯ Compact video cassette EC-30
☞ Page 5
Allows 30 minutes of recording and playback in SP mode, and 60 minutes of recording and playback in LP mode.

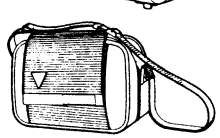


⑰ Cassette adapter C-P3U
☞ Page 28
Enables the EC-30 compact video cassette to be used with regular VHS machines.

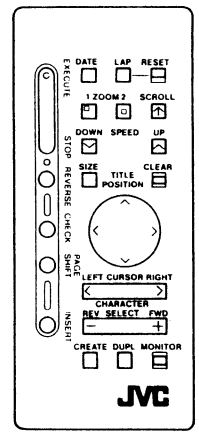


⑱ Carrying case CB-V50U
Use to carry the GR-C7E together with accessories.

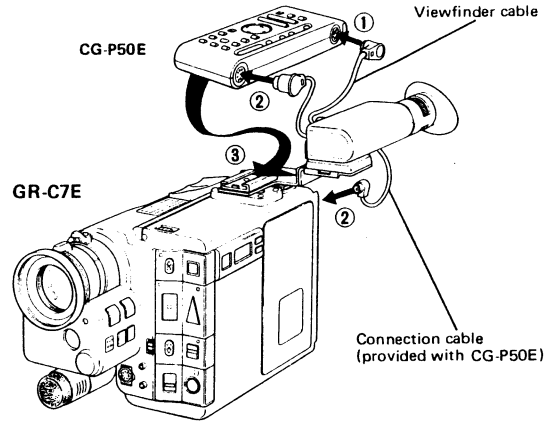
⑲ Carrying bag CB-V21U
Use to carry the GR-C7E together with basic accessories.



CHARACTER GENERATOR (optional)



CG-P50E



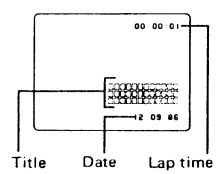
Mounting the character generator

① Connect the viewfinder cable to the character generator.
② Connect the character generator to the viewfinder cable connector (VF).
③ Slide the character generator into the accessory shoe.

The separately available character generator enables you to superimpose the date, titles and lap time on your recordings. Record dates as a reminder of the exact day a certain memorable event took place. Compose creative titles to give tapes more personality. Superimposing the lap time on some sports or action scenes can add extra drama to their viewing. Various techniques are possible to introduce more variety to your video productions.

- Twelve different pages are available for titling. (Of them, four can be used for zooming titles.)
- Two scroll pages, each storing up to 37 lines of 12 characters, are also available for titling.
- Titles can be held in memory for about one year.
- For more details refer to the instruction manual of the CG-P50E.

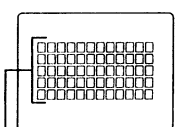
Contents



46 available characters

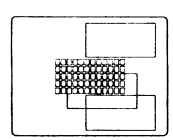
Different character sizes

Display capacity per page

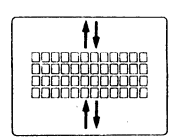


Up to 60 characters
(12 characters x 5 lines)

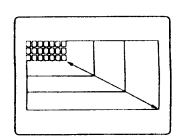
Flexible title positioning



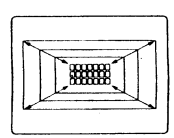
Up/down scrolling



Zooming from corner



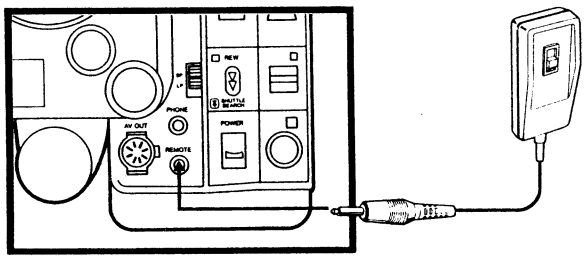
Zooming from centre



REMOTE CONTROL UNIT (optional)

The remote control unit RM-P1U (optional) permits recording start/stop to be controlled from a distance.

1



Plug the remote control cable into the REMOTE connector.

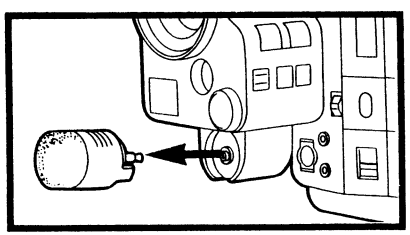
2 Press the REC STBY button to engage the Recording Standby mode.

3 To start recording, set the remote control's switch to REC; to stop temporarily, set it to PAUSE.

EXTERNAL MICROPHONE

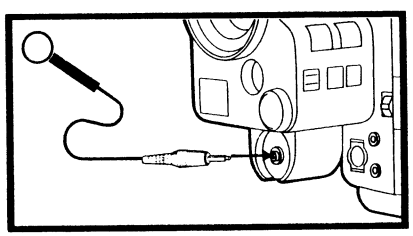
The provided microphone can be detached. To use another microphone, do the following:

1



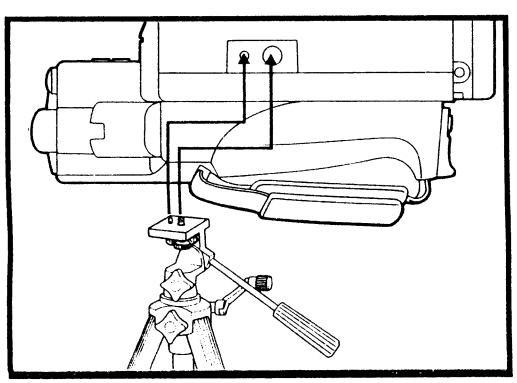
Remove the provided microphone by grasping the microphone's base and then pulling it straight out.

2



Plug the external microphone's cord into the microphone jack.

TRIPOD MOUNTING



Align the screw and camera direction stud of the tripod with the camera's tripod mounting socket and stud hole, and firmly tighten the screw.

SUPPLEMENTAL INFORMATION

What is "colour temperature"?

Light is composed of various colour components in different proportions. A relationship exists between the temperature of a light source and the colour components of the emitted light; as the temperature rises, the colour of the light varies from red, orange, yellow, white to blue in that order. "Colour temperature" is a value that expresses differences in colour among light sources, measured in Kelvin degrees. Bluish light has a higher colour temperature than reddish light.

What is "white balance"?

Making the colours look natural on TV is what white balance is all about. Because a camera is not as adaptable as the human eye, if a light source is reddish, white subjects in that light are recorded as reddish. White balance adjustment is performed to compensate for colour temperature variations of light so that whites are reproduced as white. Correct white balance makes all other colours correct. The GR-C7E can perform automatic white balance adjustment in the full-auto mode. However, if illumination is insufficient, white balance adjustment cannot be performed. To obtain correct colours, therefore, sufficient illumination is essential.

What is "illumiance"?

"Illuminance" (also called 'luminance') is the intensity or brightness of light, expressed in lux. The GR-C7E is designed to provide best pictures under the conditions of a 700-lux illuminance, although shooting is possible all the way down to 15 lux. To obtain good pictures in very bright light, the use of an ND (neutral density) filter is recommended. See chart on this page.

How to get good colour pictures

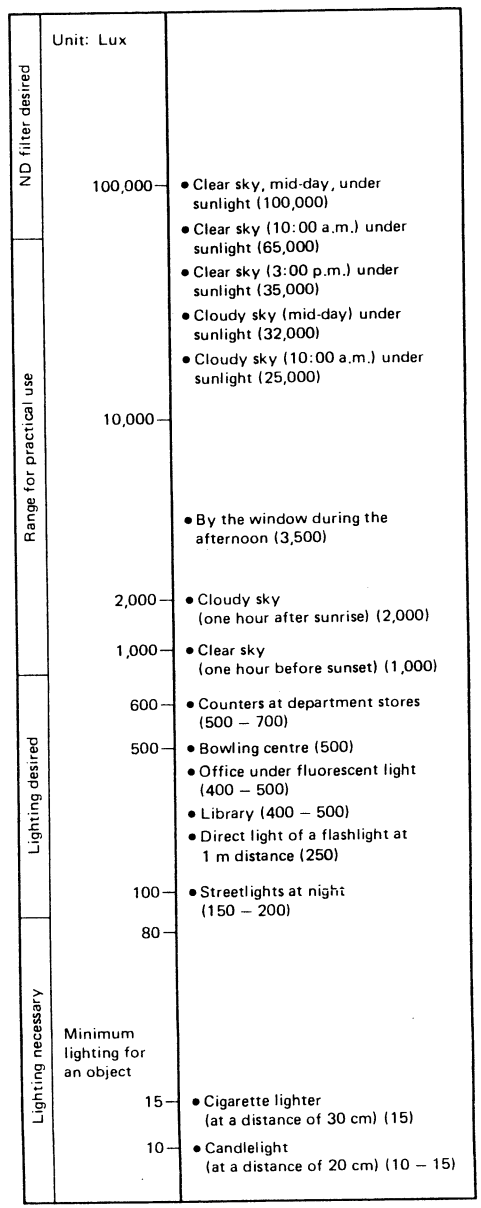
The simplest way is to provide sufficient lighting (close to the camera's reference illuminance) and accurately adjust the camera to the colour temperature of that lighting. If light sources of different colour temperatures are used together, accurate white balance adjustment is very difficult. For example, if natural light is mixed with artificial light, which is likely to occur next to windows, correct colours of the subject are difficult to obtain. It is recommended in such cases that curtains in the room be closed to shut out light from outside. Also, when artificial lighting devices are used, they should all have the same colour temperature. For example, it is recommended that incandescent or halogen lamps not be used together with fluorescent lighting.

Colour temperatures of various artificial lighting

Type of illumination		Colour temperature
Tungsten lamp for home use		2800 K
Tungsten lamp for photographic use		3200 K
Quartz-halogen lamp		
Blue lamp for photographic use		5000 K
Fluorescent lamp	Warm white	3500 K
	White	4500 K
	Daylight type	6500 K

Illuminance chart

- The values on this chart are approximated to give you a rough reference.



IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

Symptoms	Check points
Power	
No power is supplied.	●Is the battery pack correctly installed? ●Is the battery pack charged? ●Is the power supply unit correctly connected? ●Is the POWER switch of the connected AC adapter set to ON?
Recording	
Recording is impossible.	●Check to see if the cassette safety tab is in place. See page 5.
Picture colours greatly differ from actual subject colours.	●If in the manual white balance mode, check the setting of the 🌤 / ☀ button.
No sound is recorded with an external microphone.	●Is the microphone's switch set to ON?
Recording does not start.	●Have you pressed the REC STBY button first?
Playback	
Tape is running, but no playback picture appears.	●Is the VIDEO/TV switch of the RF unit set to VIDEO? ●Is the TV receiver set to your video channel?
Noise bars appear in the playback picture.	●Use the TRACKING control to reduce noise bars.
Playback picture is blurred or interrupted while TV programmes received are clear.	●Video heads may be dirty or worn out. For head cleaning or replacement, consult the nearest JVC dealer.
Tape transport	
Tape stops during fast forward or rewind.	●Is the "M" indication visible in the tape counter? If so, press the MEMORY button to cancel the memory function.
Rewinding or fast forwarding is impossible.	●Check to see if the tape has already been fully wound on one reel or the other.
Other	
No function is available with more than two mode indicators lit.	●If this should happen when using power supply units other than the battery pack, turn their POWER switch on and off. With a battery pack, replace it with another charged one.

The GR-C7E is a microcomputer-controlled device. External noise and interference might prevent it from functioning properly. In such cases, first disconnect its power supply unit (battery pack, AC power adapter, etc.); and then reconnect it and proceed as usual from the beginning.

SPECIFICATIONS

Format : VHS standard
Power source : DC 9.6 V ⎓
Power consumption : 8.0 watts
Signal system : PAL
Recording system : Luminance: FM recording
Colour: Converted sub-carrier direct recording
Conforms to VHS standard
Cassette : VHS-C cassette
Tape speed (SP) : 23.39 mm/sec
(LP) : 11.70 mm/sec
Recording time
Max. (SP) : 30 minutes (with EC-30 cassette)
(LP) : 60 minutes (with EC-30 cassette)

VIDEO
Output : 1 Vp-p, 75 ohms, unbalanced (via AV OUT connector)
S/N ratio : 40 dB (with Rohde & Schwarz noise meter)

AUDIO
Output : -6 dBs, 1 k-ohm (via AV OUT connector)
Microphone input : -68 dBs, high impedance, unbalanced
Pickup : 1/2"-format CCD
Minimum required illumination : 15 lux (at F 1.6)
Illumination range : 15 – 100,000 lux
Lens : F 1.6, f = 9 – 54 mm, 6:1 power zoom lens with auto iris control and macro position, filter diameter 49 mm
Viewfinder : Electronic viewfinder with 0.6" black/white CRT
Colour temperature switching : Switchable (3,200 K/5,500 K)
White balance adjustment : Full-auto/preset standard
Operating temperature : 0°C to +40°C
Operating humidity : Less than 80 %
Storage temperature : -20°C to +50° C
Weight : 1.4 kg (with viewfinder)
Dimensions : 121(W) x 165(H) x 223(D) mm (incl. viewfinder)

AA-V2EG SPECIFICATIONS
Power supply : AC 110 – 240 V∿, 50/60 Hz
Power consumption : 30 watts
Rated output voltage: DC 9.6 V ⎓
Rated output current: 1.2 A
Charging system : Constant current, peak detection, timer controlled
Dimensions : 57(W) x 67(H) x 200(D) mm
Weight : Approx. 700 g

C-P3U SPECIFICATIONS
Type : VHS cassette adapter
Dimensions : 188(W) x 25(H) x 104(D) mm
Weight : 235 g
Accessory : "R6"-size battery x 1

RF-P1E SPECIFICATIONS
Output channel : UHF channels 32 – 40 (adjustable)
Initial channel setting : UHF 36
Power source : DC 8 V ⎓ 20 mA (from VideoMovie)
Dimensions : 55(W) x 93(H) x 24(D) mm excl. cable
Cable length : 2.5 m
Weight : Approx. 160 g

Provided accessories
High-capacity battery pack (1.0 AH) NB-P7U
AC power adapter/battery charger AA-V2EG
RF unit RF-P1E
Aerial cable
Dubbing cable x 2
Compact video cassette EC-30
Cassette adapter C-P3U
Electronic viewfinder VF-V7E
Shoe adapter
Lens hood
Lens cap
Shoulder strap VU-V17U
Carrying case CB-V50U
Grip pad

Optional accessories
Regular battery pack (0.5 AH) NB-P5U
Medium-capacity battery pack (0.7 AH) NB-P6U
High-capacity battery pack (1.0 AH) NB-P7U
Super high-capacity battery pack (1.8 AH) NB-P8U
AC power adapter/battery charger AA-V2EG/EK
Car battery charger BH-V5E
Car battery cord AP-P1E
Cassette adapter C-P3U
Compact video cassette EC-30
Carrying bag CB-V21U
Shoulder strap VU-V17U
Carrying case CB-V50U
Remote control unit RM-P1U
A/V extension cable VC-P2U
Conversion cable VC-V810U
Character generator CG-P50E

Design and specifications subject to change without notice.

SECTION 1
DISASSEMBLY

1.1 DISASSEMBLY

1.1.1 Electronic viewfinder removal

1. Refer to Fig. 1-1-1 and disengage the 8-pin connector. While gently pressing the viewfinder upward, slide it in the direction shown by the arrow (A) to remove it.

1.1.2 Viewfinder shoe and upper case

1. Take out two screws indicated by A in Fig. 1-1-2(A). Raise the shoe as indicated by arrow (B) and remove the show and shoe clip.
2. Refer to Fig. 1-1-2(A) and 1-1-2(B), and take out screws C, D, E, F and G (two screws).
3. As shown in Fig. 1-1-2(C), a plastic tab joins the upper case to the front panel. Gently press at the location of the tab and slide, then raise the upper case as indicated by the arrow (H). Raise it only slightly to allow detaching the tape counter (use care not to damage the flexible cable of the counter), then remove the upper case completely.

Note: The two screws A of Fig. 1-1-2(A) are the longest.

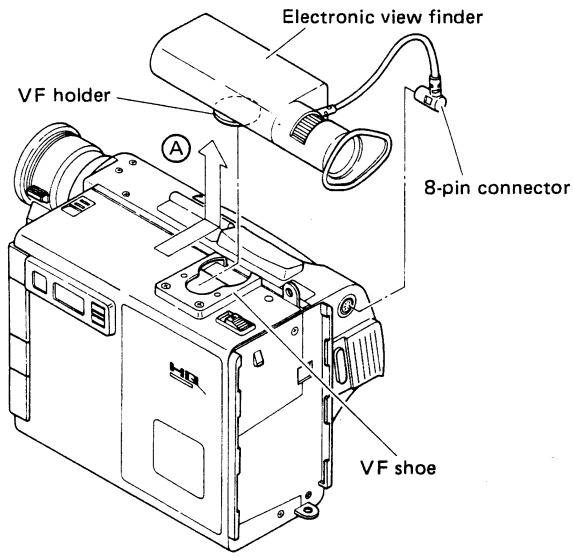


Fig. 1-1-1

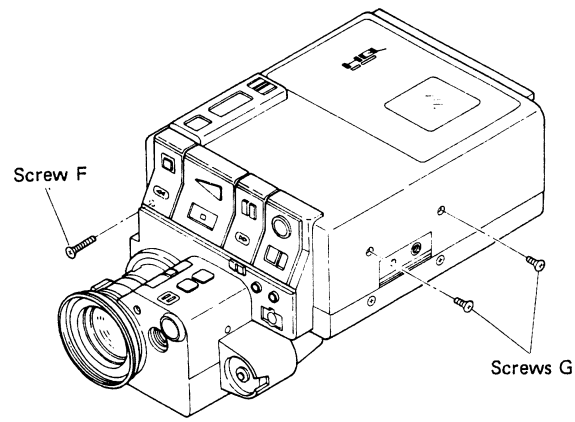


Fig. 1-1-2 (B)

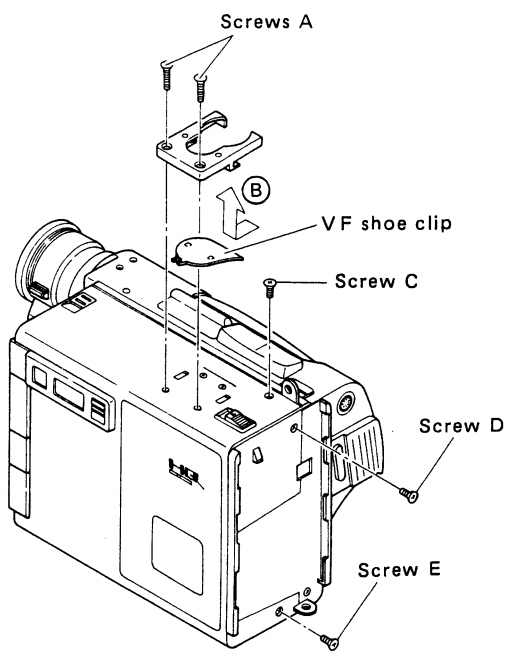


Fig. 1-1-2 (A)

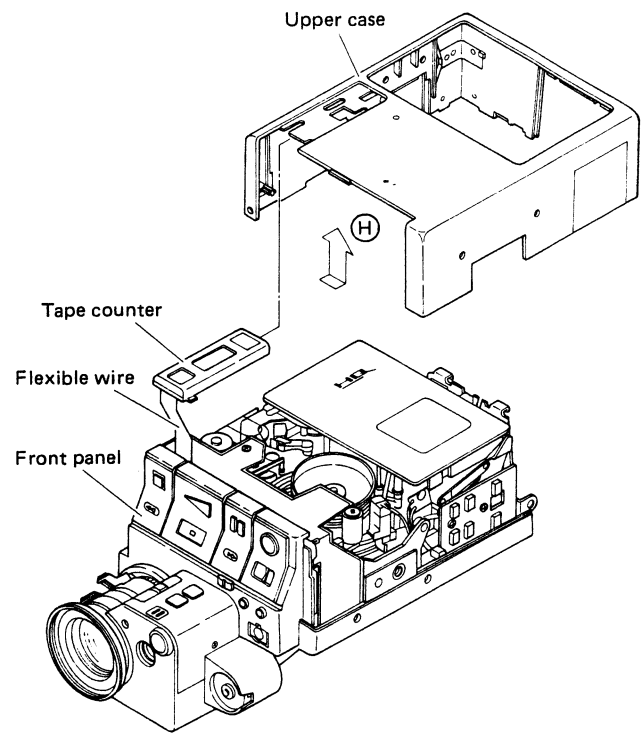


Fig. 1-1-2 (C)

1.1.3 Cassette cover and deck section

1. Refer to Fig. 1-1-3 and take out two screws A that secure the cassette cover. Raise the cassette cover as indicated by the arrow (B) to remove it.
2. Take out two screws C and remove the base assembly.
3. Take out three screws D and one screw E.
4. The front panel and side panel are engaged by a plastic rim. Carefully squeeze the portions of the side panel indicated by the arrows (K) between thumb and forefinger and raise the deck section slightly to disengage it.
5. Disconnect five connectors F, G, H, I and J. The deck and operation sections can then be separated from the camera section.

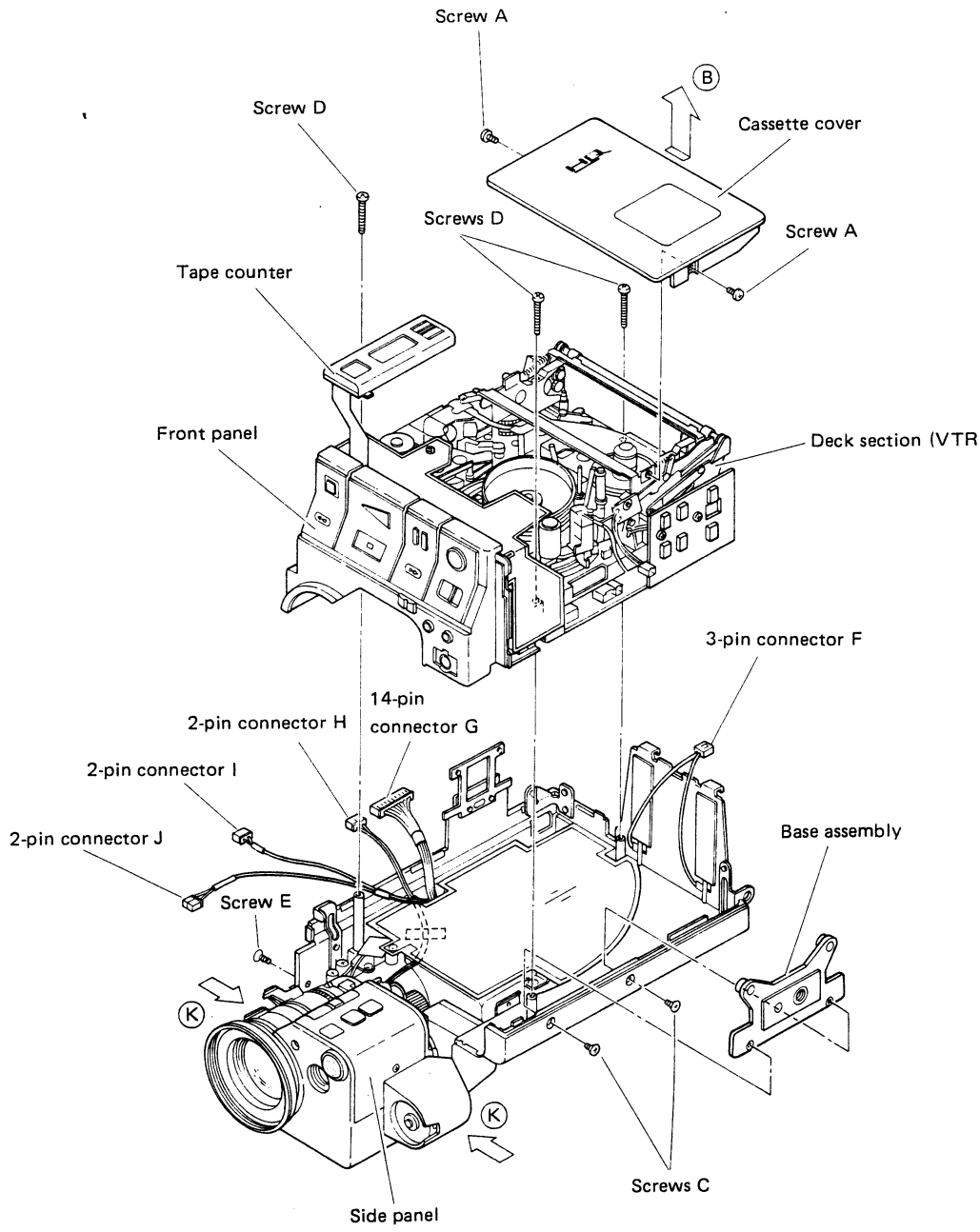


Fig. 1-1-3

1.1.4 Lower case

1. Refer to Fig. 1-1-4. Take out screws A and B, and remove the insulator sheet.
2. Take out screws C, D and E. Disengage the side panel from the lower case by shifting and raising it as shown by the arrow (F) . Disconnect the connector G.
3. Remove the screw H, screw I and plate J. Then take out screws K and L.
4. Raise the camera section slightly and disconnect connectors M, N and O (which are connected to the EE and IND board) to remove the camera section from the lower case.

Note: Use care not to damage the wires and flexible cables.

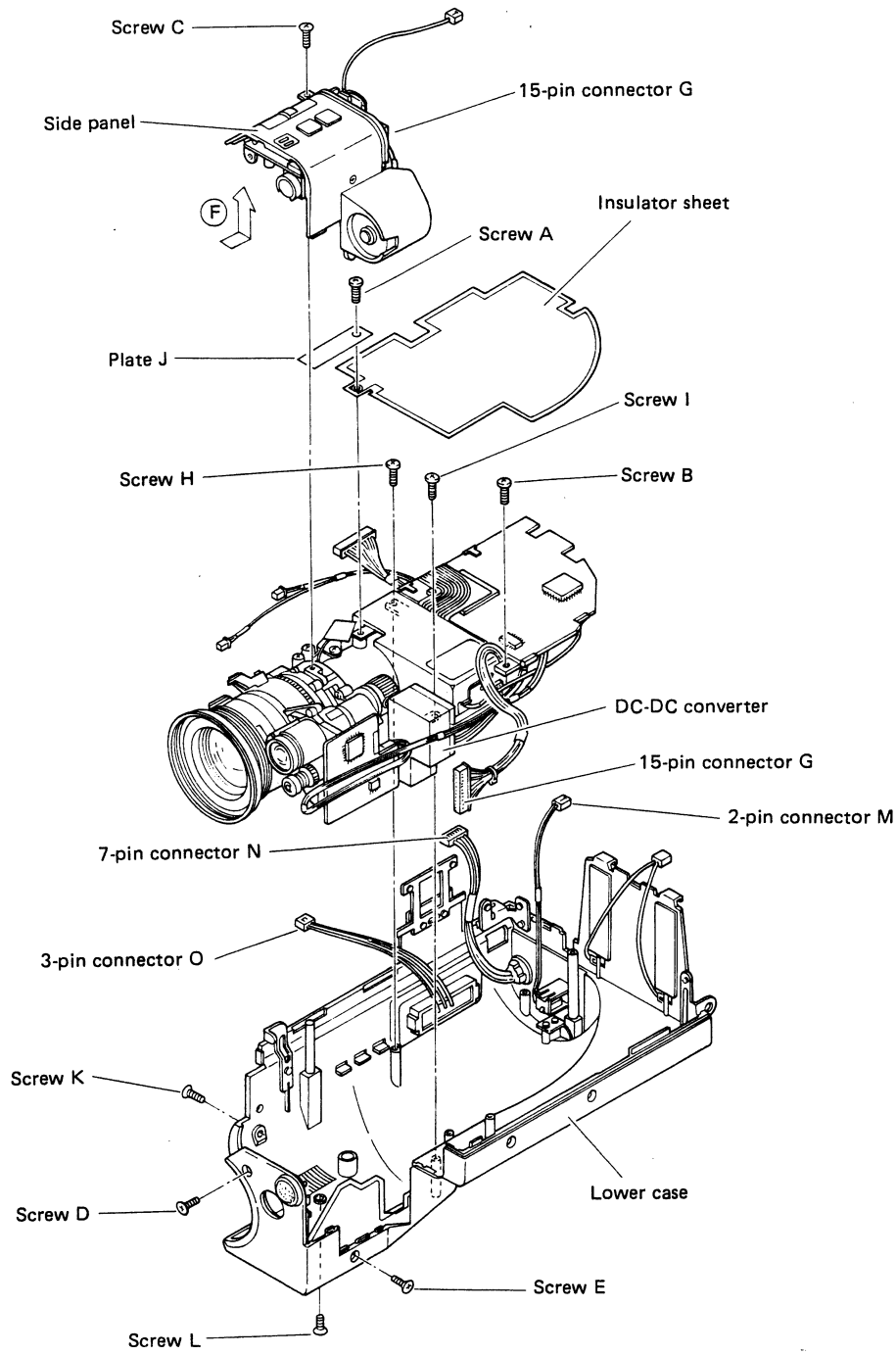


Fig. 1-1-4

1.2 CIRCUIT BOARD REMOVAL

1.2.1 Deck section

1. Refer to Fig. 1-2-1 and remove the front panel in the direction shown by the arrow Ⓐ . Then take out three screws B and two screws C to remove the operation board. Use care regarding the front panel push buttons.
2. Take out screws J and K, and remove the shield plate. Then remove the skew jump board and Y/C board in the direction Ⓓ and disconnect connector E, which is connected to the pre amp board.
3. Take out the screw F. Peel off two strips of tape that secure the main board. Disconnect twelve connectors G and remove the main board in the direction Ⓗ .
4. Take out two screws I to remove the end alarm board.

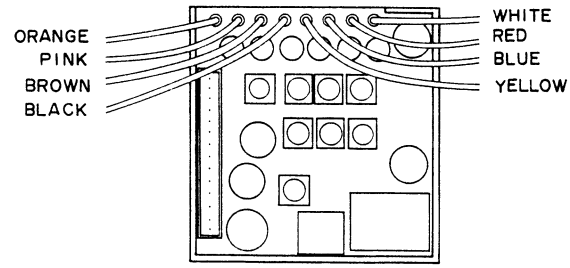


Fig. 1-2-1 (B) Pre amp wires location

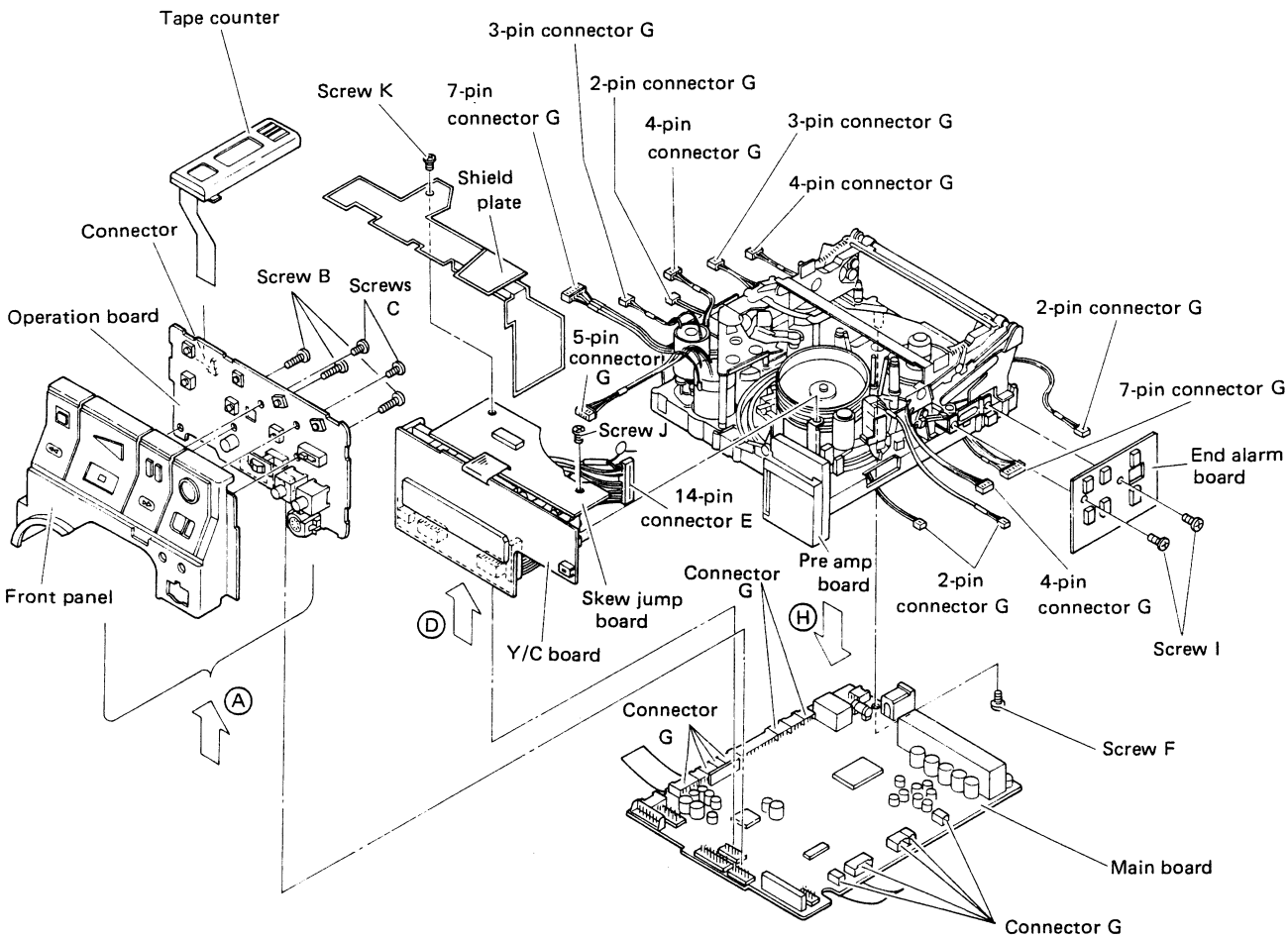


Fig. 1-2-1 (A)

1.2.2 Control board

1. Refer to Fig. 1-2-2 and take out four screws A. Disconnect connector B and remove the control board from the side panel.

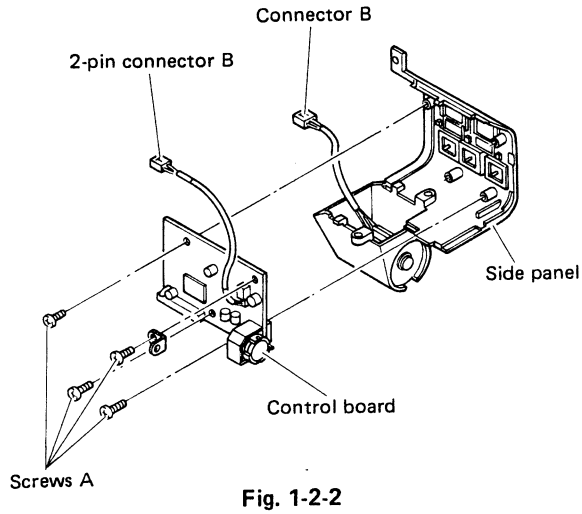


Fig. 1-2-2

1.2.3 Camera section

1. Refer to Fig. 1-2-3 and disconnect the connector A. Remove board holders B and C in the directions D and E.
2. Remove the regulator board and EE & IND board in the directions F and G.
3. The regulator board is attached directly to the EE & IND board by an 8-pin connector. Similary, the EE & IND board is attached directly to the camera board by three connectors.

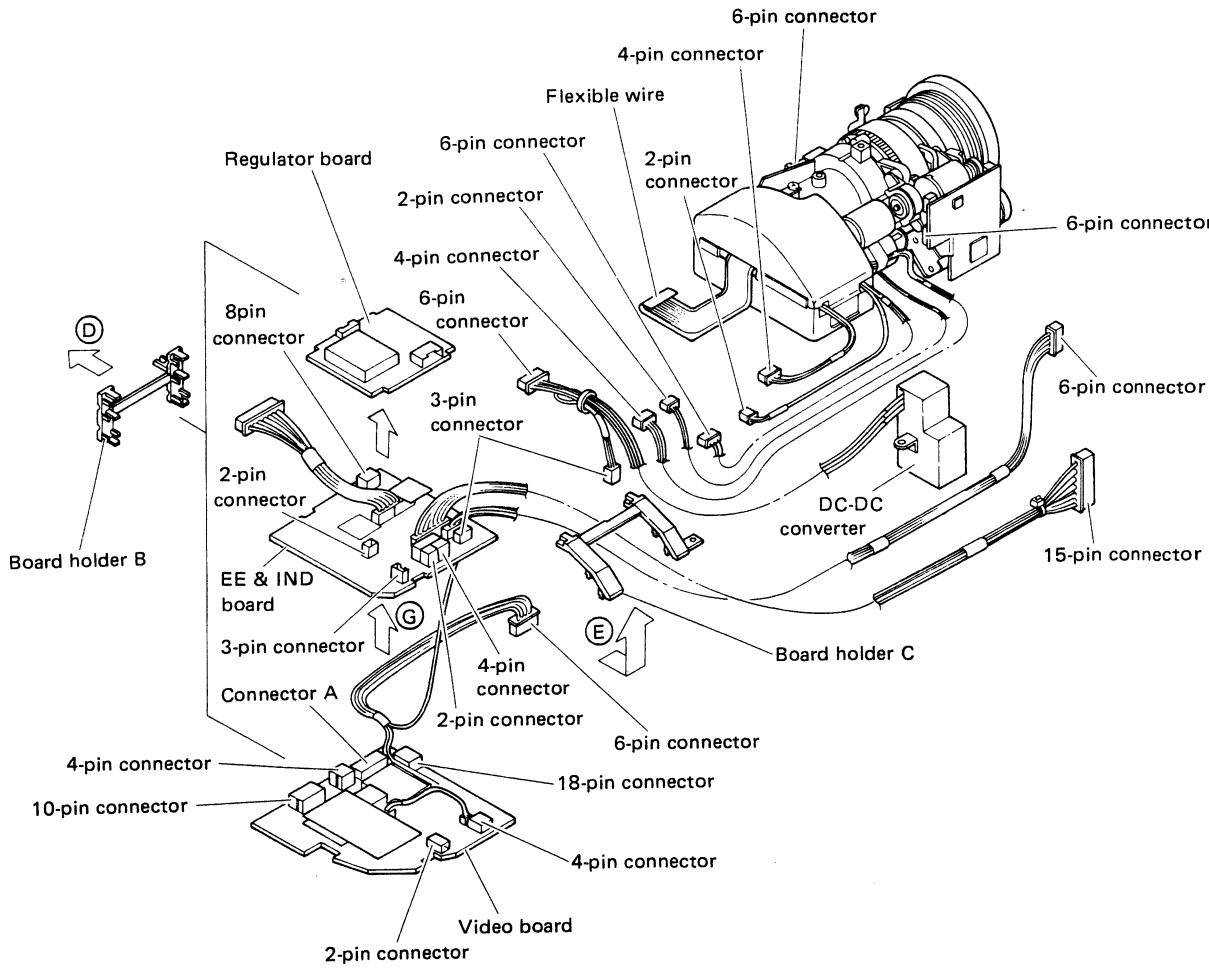


Fig. 1-2-3

1.3 IMAGE SENSOR REPLACEMENT

1.3.1 Precautions

1. The CCD image sensor is subject to electrostatic breakdown in the manner of C-MOS devices, but even more so. Storage, handling and soldering must be performed with the precautions appropriate to such devices.
2. Use care to protect the optical surface of the CCD image sensor from soiling, scratches, fingerprints, etc. If soiled, clean gently with silicon lens tissue, chamois, etc.
3. An orange protector seal is applied to the CCD image sensor before shipment from the maker. Do not remove the seal until immediately before installing the sensor in the optical block.
4. Perform soldering quickly. The optical filter of the CCD image sensor can be discolored by excessive heat.

1.3.2 CCD image sensor removal

1. Refer to Fig. 1-3-1 and take out two screws A. Separate the optical block and the Imager board.
2. Take out three screws B from the filter holder C and remove the filter holder, filter D and rubber spacer E.
3. Take out two screws F from the image holder G.
4. Unsolder and remove the image sensor H.

1.3.3 CCD image sensor installation

1. Remove the protective seal from the CCD image sensor and place it on the imager holder (G). Then atop these, place the rubber spacer, optical filter (D) and filter holder (C). Observe that the CCD image sensor is correctly oriented with respect to the imager holder board. Also check that while marking of the optical filter is positioned at the lower front. Secure the filter holder to the imager holder with three screws (B).
2. While observing proper direction, install the filter holder to the optical block with two screws (A).
3. Very carefully insert the CCD image sensor pins protruding from the imager holder into the holes of the imager board, then secure with two screws (F).
4. Solder the CCD image sensor pins to the imager board. Use care to avoid overheating.

1.3.4 Adjustments

1. Perform back focus adjustment.
2. Electrical adjustment is not necessary.

Note: In event the monitor picture is not centered or is inclined, loosen two screws (8) and adjust by shifting the overall Imager Board.

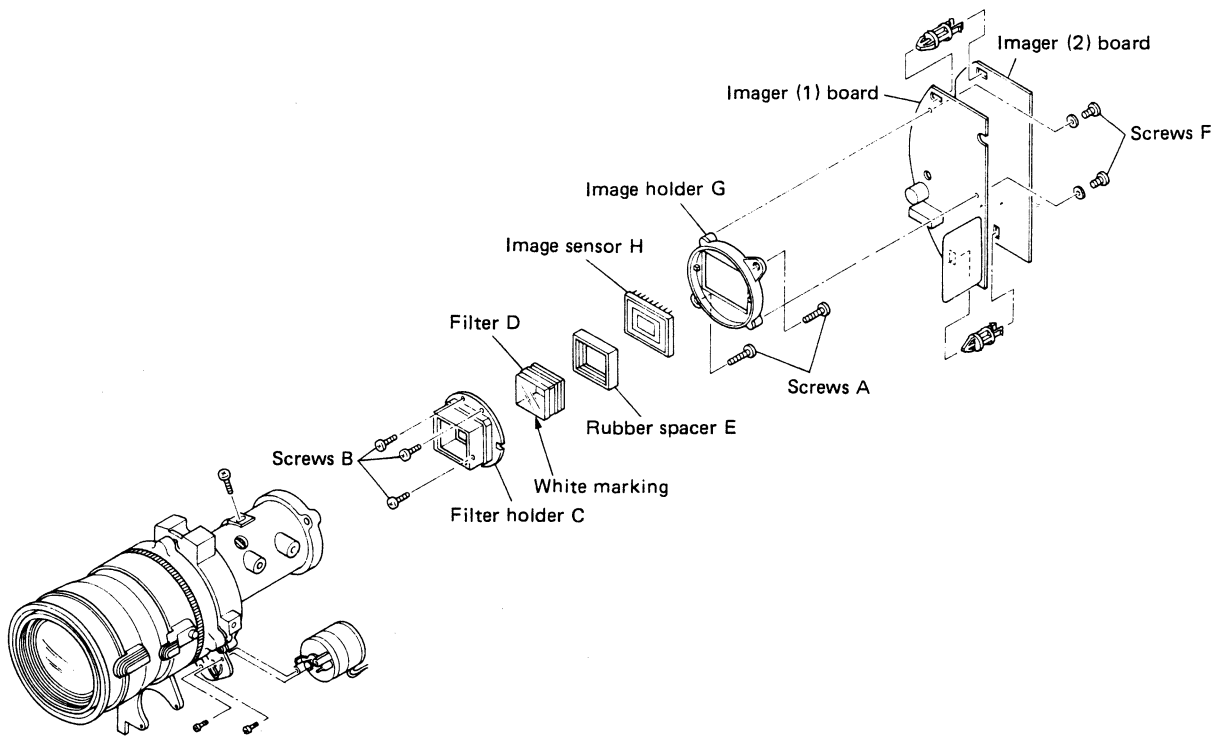
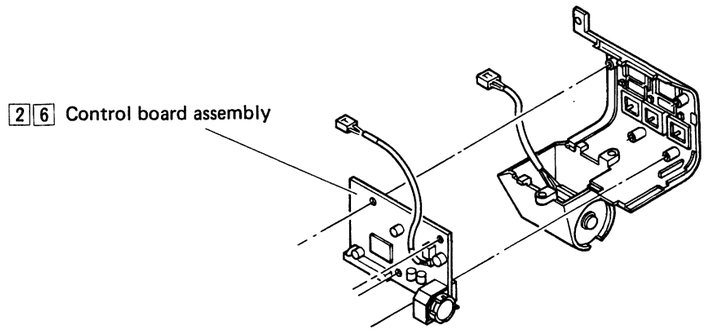
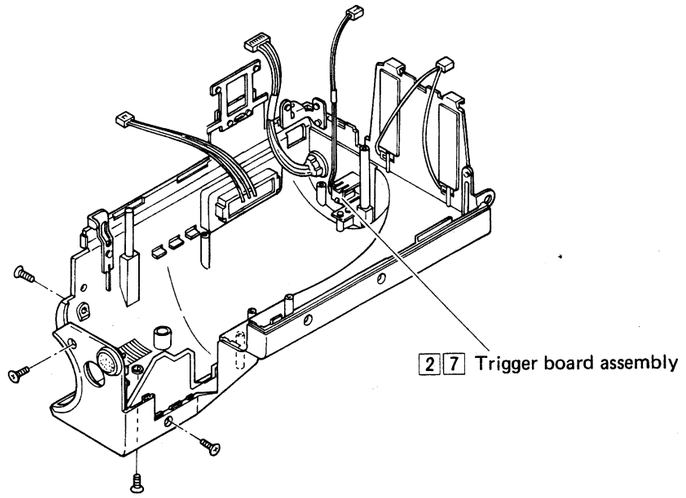


Fig. 1-3-1

1.4 MAIN COMPONENT LOCATIONS

1.4.1 Deck and camera portions (1)





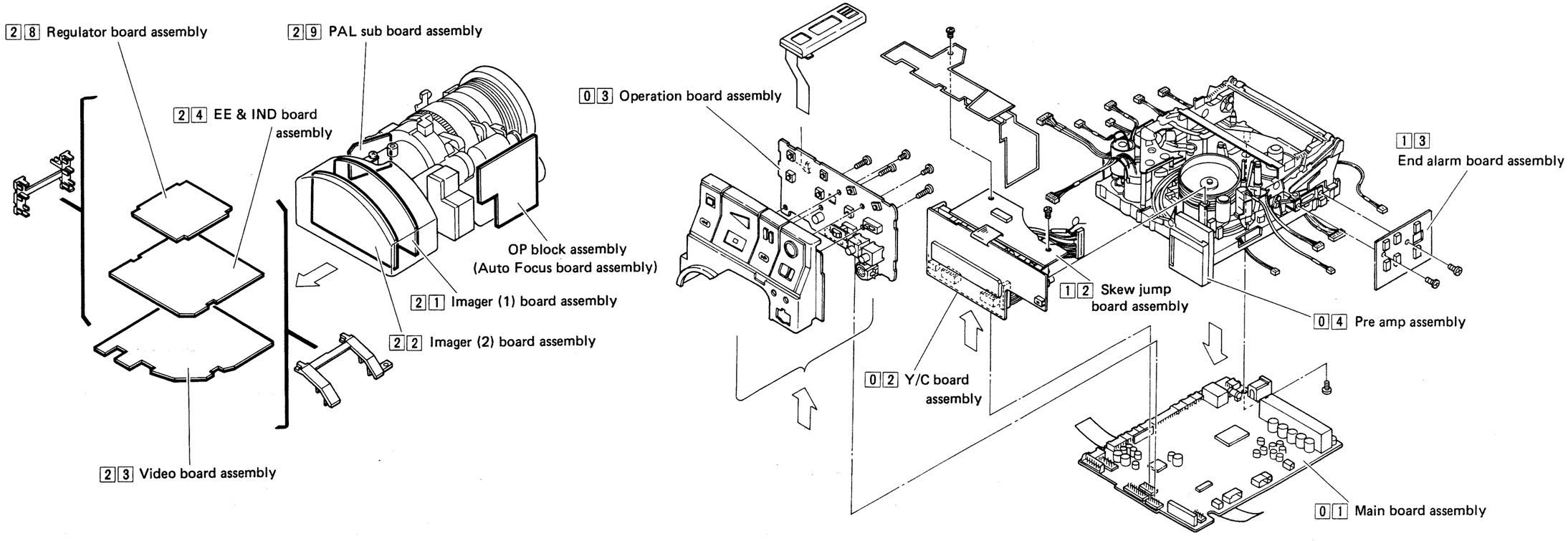


Fig. 1-4-1

1.4.2 Deck and cemara portions (2)

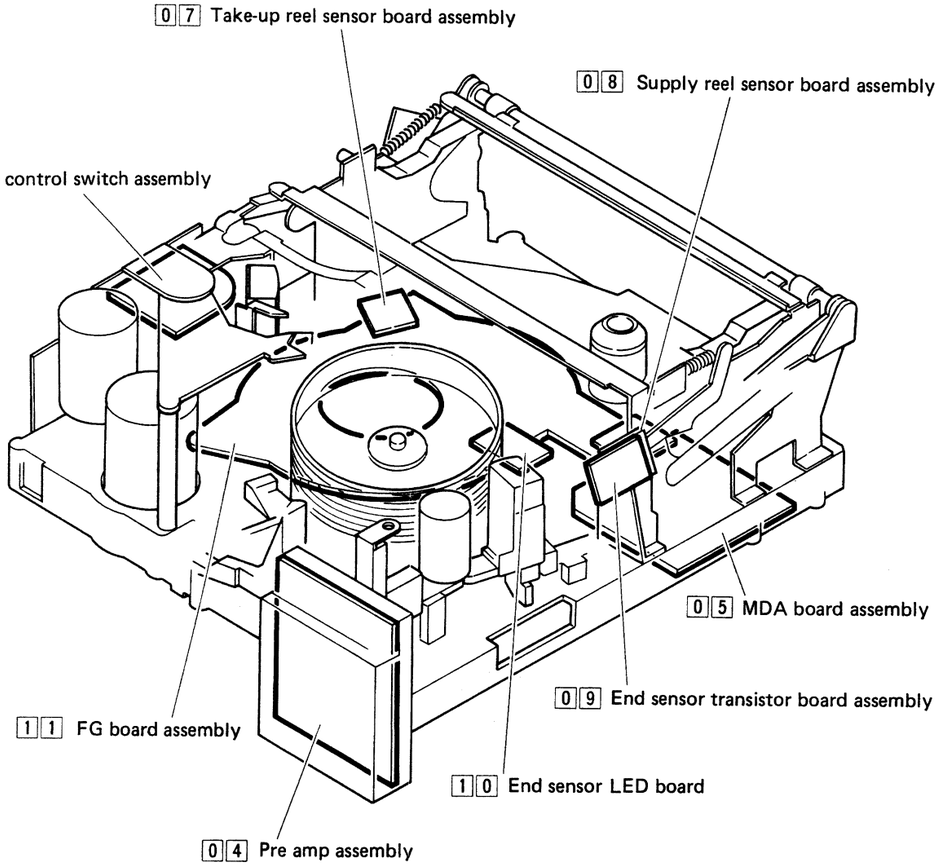


Fig. 1-4-2

1.5 EMERGENCY MODE CHECK LIST

The Videomovie model features self-diagnostic functions which provide convenient reference during troubleshooting and service. In event of malfunction, the Emergency mode is automatically detected by the CPU of the Mechacon circuit. The operation LEDs are then lighted according to the type of malfunction. The following considerations are recommended when utilizing these indications.

1.5.1 Emergency mode indication

This table shows the probable causes, checkpoints and normal operation waveforms for Emergency mode indications 1 through 27. When the Emeragency mode occurs, perform service by checking with reference to the table.

Note: Portions of the table may not apply to certain Videomovie models.

1.5.2 Service check list (for test mode)

The test mode switch is a service fixture used for the service check functions. To start the test mode, perform as follows.

1. Disconnect power from the Videomovie.
2. Connect the test mode switch to CN10A of the MAIN board.
3. Insert a recordable cassette into the Videomovie.
4. Set the test mode switch to the appropriate code number of the service check list.
5. Supply power.
   Only one test item is performed with each setting of the test mode. To change to a different test, again perform the above steps (in order to reset the CPU). The test mode continues until the CPU is reset (by disconnecting from power).

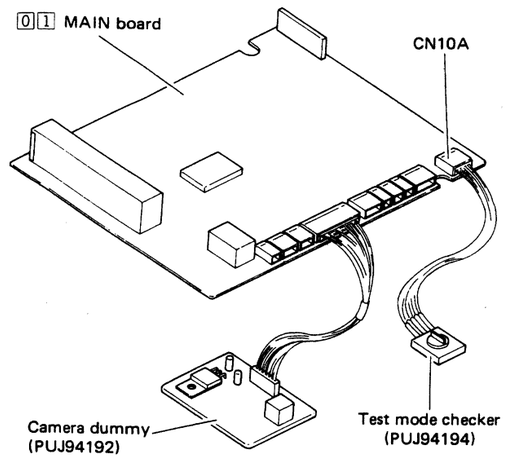


Fig. 1-5-1

1.5.3 Test mode applications

Code 1
This test is used for checking the operation key scan circuit function without operating the set. Switch connection, operation and circuit functions can be conirmed.
Normally, the corresponding LED should light when each operation key is pressed. If the test indications are normal, a problem can be attributed to a cause outside the key scan circuit.

Code 2
The electrical circuits for each mode can be checked without mechanical operation. This test is useful for determining whether a problem is in the mechanical or electrical systems. When each operation key is pressed, the corresponding mode is set-up electrically. However, the loading (mode control) motor does not turn and the machanism does not operate.

Code 3
This test starts automatically when power is supplied and provides repeated operation of the loading and unloading functions. Use a "recordable" cassette, since operation is in the REC Pause mode.

Code 4
Fast Forward and Rewind test. After power is supplied, the Stop mode continues for about 90 seconds, then FF is performed.

Code 5
Play (repeat) test.

Code 7
Checks REC Lock and power relay circuits. In modes other than REC Lock, the Stop mode is entered automatically and the power relay circuit is checked. Use this test for checking power on/off operation.
In the REC Lock mode (power off while a recording is in progress), the test is performed automatically when power is supplied.

Code 8
Quick review test. At recording start, the quick review test is performed 5 times, then the Recording mode is entered. If started from the Stop mode, the REC button must be pressed.

Code E
Emergency repair test. When a malfunction is detected, the Emergency mode is entered. The Stop mode is set, power is cut-off, then LED flashing begins. Further operation of the set is inhibited.
This test prevents shifting to the Emergency mode and permits checking for the cause of difficulty. In this mode, the sensor inputs are ignored.

Code F
Normal program. Allows normal program operation while the test mode switch is connected.

1.6 APPEARANCES AND WIRINGS OF CABLES

- **Audio/Video cable assembly**

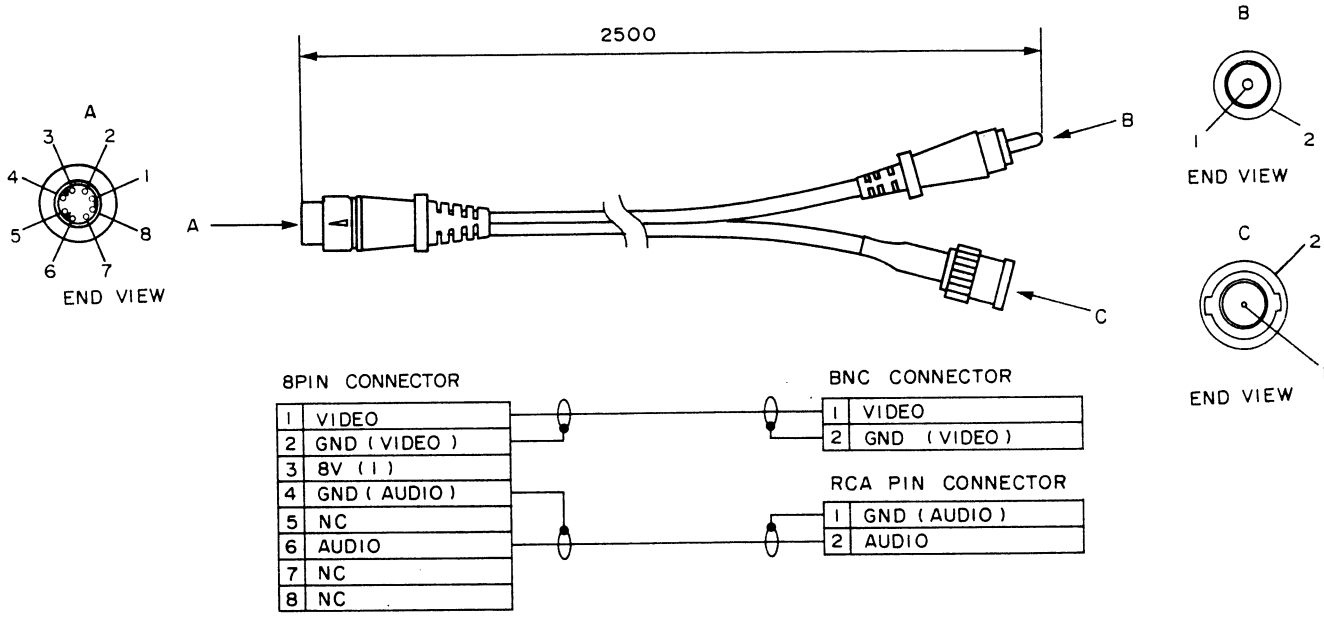


Fig. 1-6-1

- **21-pin/8-pin**
  Conversion cable assembly

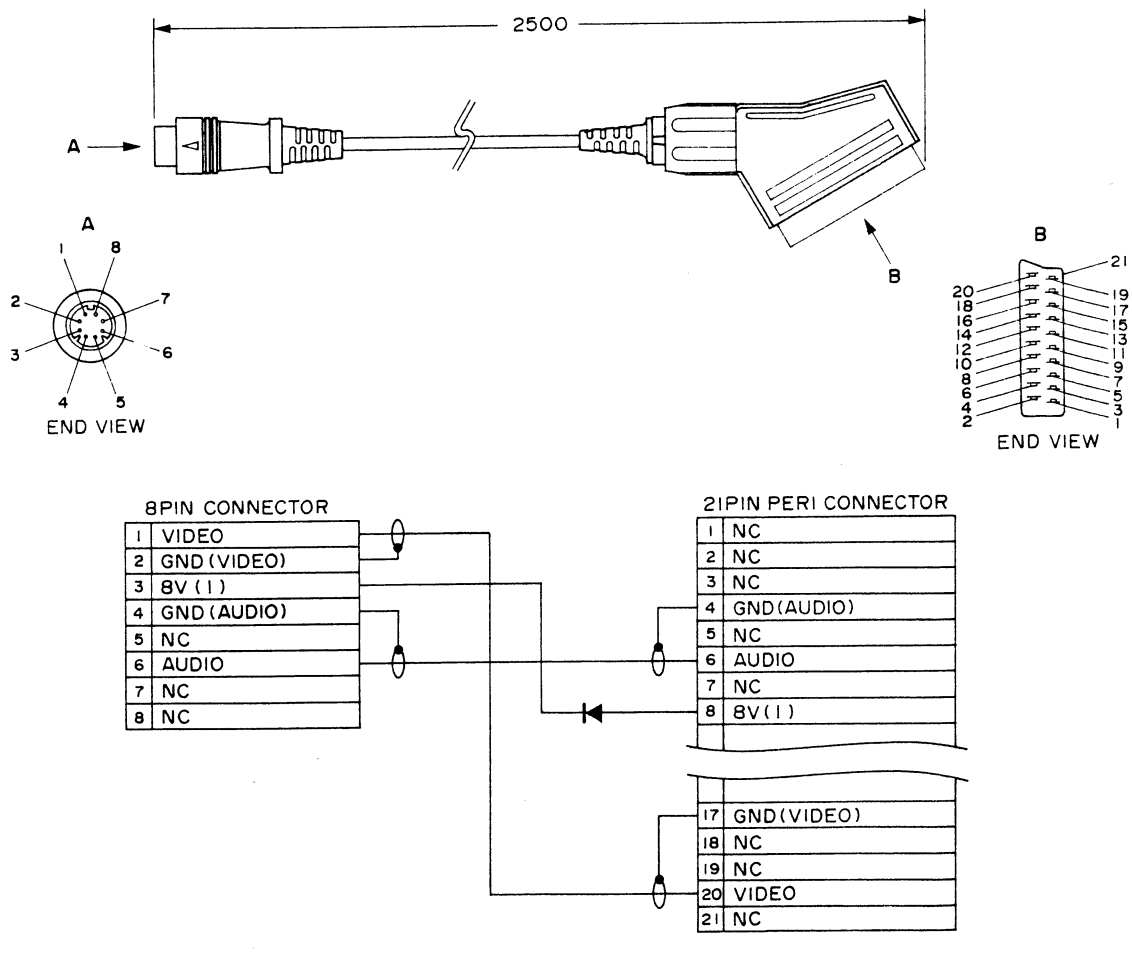


Fig. 1-6-2

- **Audio/Video extension cable assembly (VC-P2U)**

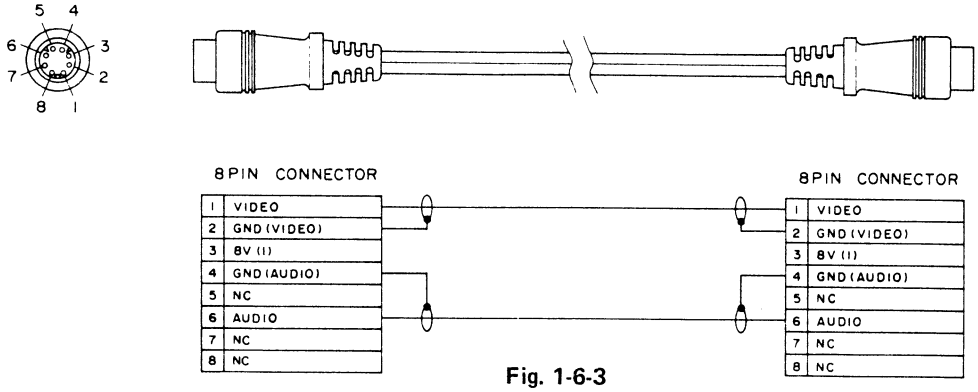


Fig. 1-6-3

- **8-pin/10-pin conversion cable assembly (VC-V810U)**

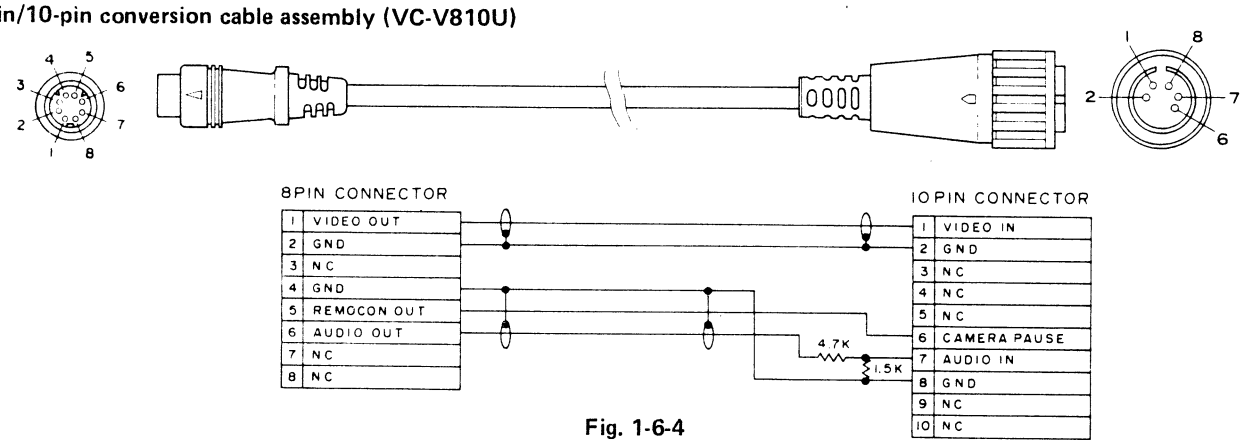


Fig. 1-6-4

1.7 TAPE COUNTER DISPLAY vs. TAPE RUNNING TIME

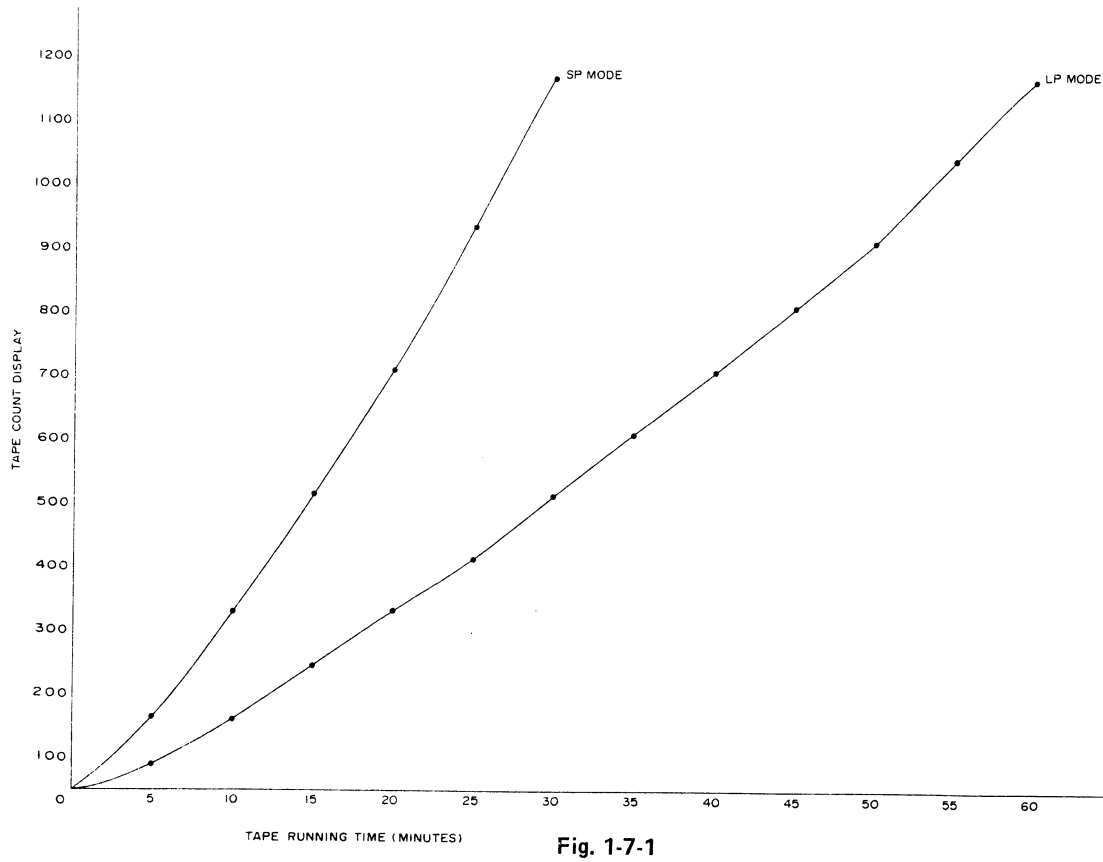


Fig. 1-7-1

SECTION 2
MECHANICAL ADJUSTMENT

2.1 BEFORE PROCEEDING

1. This section describes procedures for replacing mechanical parts which have become defective due to wear or other reason.
2. Perform carefully since mechanical and electrical adjustments are interrelated. In some cases, the mechanical adjustments form the basis for electrical adjustments.
3. To observe the loading operation without using a cassette tape, cover the end sensor with black tape and close the cassette switch contacts. Turn the reel disk by hand in order for loading to proceed (unloading is performed if reel rotation stops).

2.2 SERVICE FIXTURES AND TEST EQUIPMENT

1. Table 2-1 indicates the special service fixtures required for this model.
2. In addition to these, the following tools and test equipment are also required.
   - Properly adjusted color TV monitor
   - Oscilloscope, wideband, dual-trace with delay function
   - Hexagonal (Allen) wrenches, inch sizes (including 0.135 Inch) 0.135 Inch ≒ 0.89 mm
   - Spare cassette tape (for recording and running checks)
   - Precision (jewelers) screwdrivers

   Also refer to the section on Electrical Adjustments.

Note: Adjusting jigs and equipment for electrical adjustment, refer to the section.

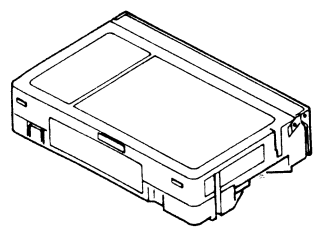
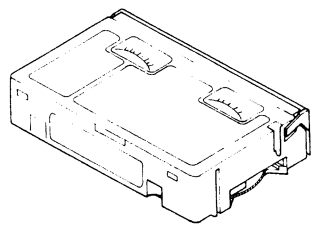
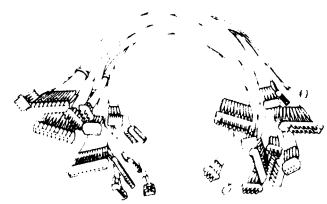
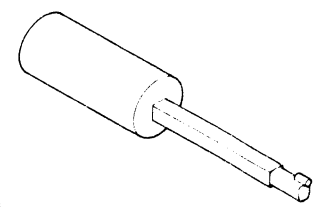
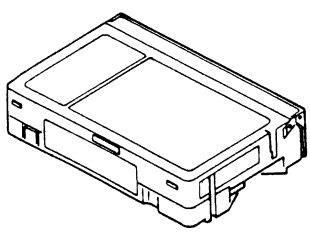
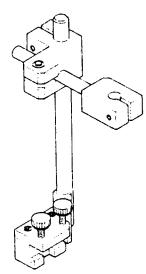
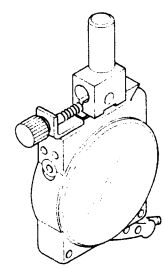
Alignment tape MH-C2	Cassette torque meter PUJ50431-2	Patch cord PUJ93991	A/CTL head position tool PUJ94196
			
Check tape CH-C5L	Micro checker stand PUJ94195	Micro meter PUJ96016	
			

Table 2-1 Jigs and adjusting equipment

2.3 MAIN PARTS LOCATIONS

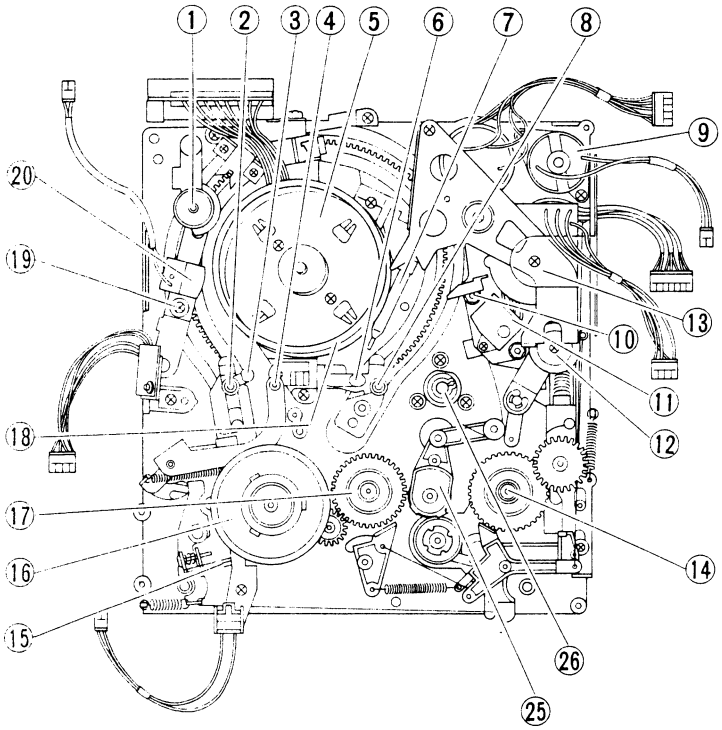


Fig. 2-1-1 Top view

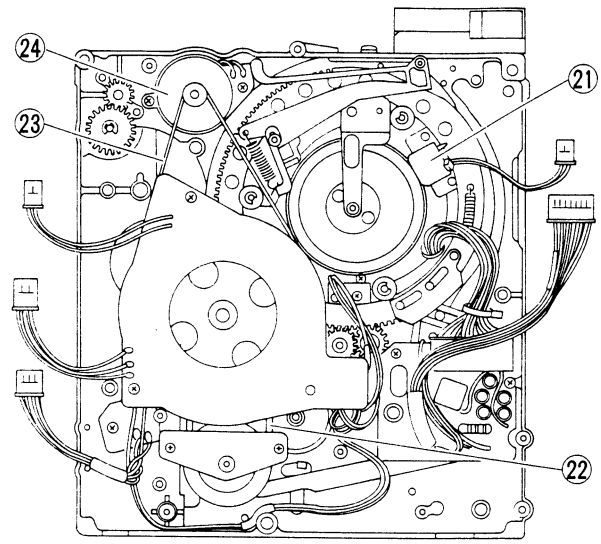


Fig. 2-1-2 Bottom view

1 Impedance roller
2 Supply guide roller
3 Supply slant pole
4 Tension pole
5 Upper drum
6 Take-up slant pole
7 Middle pole
8 Take up guide roller
9 Mode control motor
10 Take-up guide pole (2)
11 A/CTL head
12 Pinch roller
13 Cam switch
14 Take up clutch gear
15 Tension band
16 Supply reel disk
17 Supply clutch gear
18 Lower drum
19 Supply guide pole
20 Full erase head
21 Pick up head
22 Reel belt
23 Capstan belt
24 Capstan motor
25 Idler arm
26 Capstan

2.4 MAIN ASSEMBLY REPLACEMENTS

As required for replacing parts, remove the external covers, circuit boards, shield plates and cassette housing.

2.4.1 Cassette housing

1. Take out 4 screws that secure the cassette housing to the deck and replace the housing. After replacing, carefully and repeatedly observe the basic transport operations, including cassette insertion and removal, Fast Forward and Rewind. Confirm absence of unusual noise or damage to the tape.

2.4.2 Reel disk

1. Remove the slit washer and the reel disk. Note the washer at the bottom of the disk.
2. Clean the reel shaft with alcohol, then apply a small amount of light oil.
3. Replace the reel disk and confirm back tension (section 2.5.5).

2.4.3 Tension band

1. Remove the reel disk.
2. While using care in regard to the compressed spring, remove one screw and one washer.
3. Disengage the spring from the deck and replace the tension band.
4. Assemble the new tension band and reel disk.
5. Perform tension pole position adjustment and back tension check (section 2.5.5).

2.4.4 Capstan motor

1. After replacing the capstan motor, perform capstan servo sampling position adjustments.

2.4.5 Drum assembly

The upper drum, lower drum and preamp assembly of this model are matched at the time of production. Therefore, replace these as a complete assembly (the preamp is pre-adjusted with respect to the heads).

If replacing only the upper drum is unavoidable, perform the following.

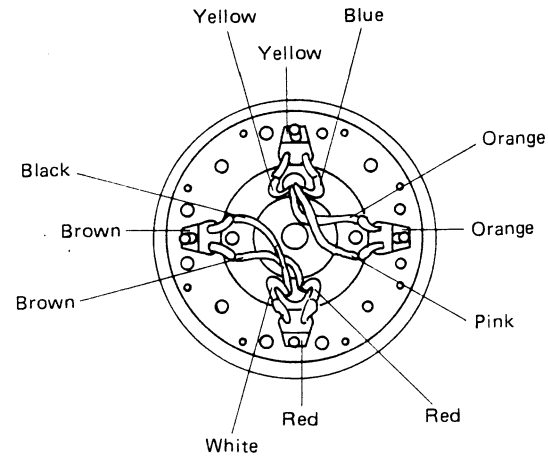


Fig. 2-2

1. Unsolder the lead wires of the upper drum relay pins. Take out 2 screws and remove the upper drum in the upper direction.
2. Install the new upper drum while using care not to touch the head tips or scratch the drum.
3. After replacing, refer to Section 2.6 and perform checks and adjustmemts of the tape transport, servo circuit, recording and play-back color level, and FM recording level.

   Also perform preamp adjustment.

Note: Perform recording and play-back in the LP mide. If picture jitter is severe, loosen the drum screws and reinstall it. Then tighten the screws.

2.4.6 A/CTL head

1. Without a cassette tape, perform loading. Cut the power just at the point the loading operation is complete.
2. Disconnect connector CN13 of the MAIN board (servo section).
3. Take out the 3 screws securing the A/CTL head. Remove the head together with the head spring.
4. Unsolder the A/CTL head wires and replace the head.
5. Use care to solder the wires to the new A/CTL head correctly.
6. After replacing, perform the Audio/Control Head Adjustments of Section 2.7.2.
7. Perform the interchangeability checks and adjustments of Section 2.7.3.

Note: To observe loading without using a cassette, press the cassette switch, cover the tape end sensor, then press the PLAY button.

2.4.7 Full erase head

1. The full erase head is replaced without removing the supply guide pole.
2. Remove the slit washer and the spring, then remove the roller arm in the upward direction.
3. Gently press the erase head arm in the outward direction and remove the screw from the rear of the deck. Then remove the full erase head from the erase head arm and replace.
4. Install the new full erase head in the proper position. Use a spare cassette tape and observe the tape running in the area of the supply guide pole.
5. If tape curling or wrinkling occurs, perform supply guide pole height and interchangeability adjustments (sections 2.6.1 and 2.7.1).

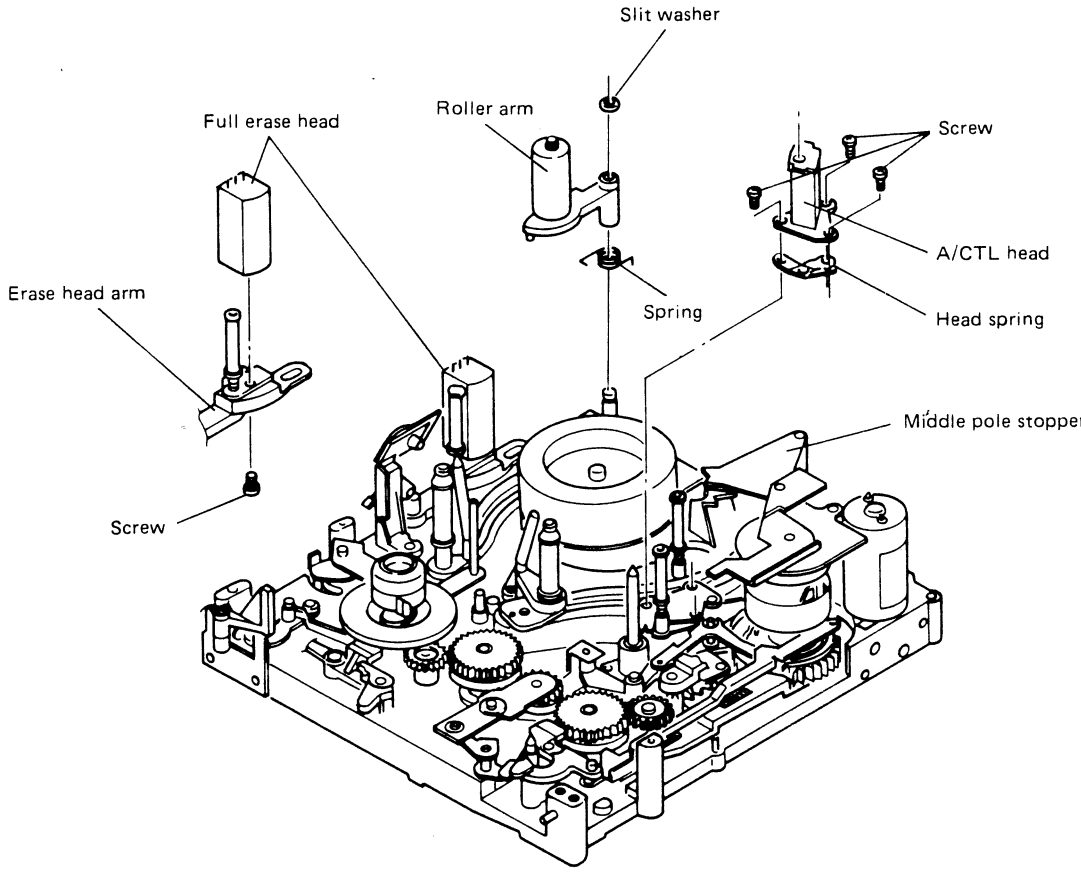


Fig. 2-3 A/CTL head and full erase head

2.5 CHECKS AND ADJUSTMENTS

After reassembling the following parts, be sure to confirm their positional relationships.

2.5.1 Mode control switch

1. In the Stop mode, confirm that the mode control switch appears as indicated in Fig. 2-4.

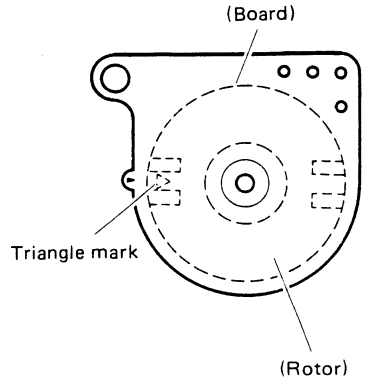


Fig. 2-4 Mode control switch

2.5.2 Pinch roller arm

1. In the Stop mode, confirm the relative positions, particularly the engagement of the gear teeth, of the pinch roller arm and pinch roller bar as indicated in Fig. 2-5.

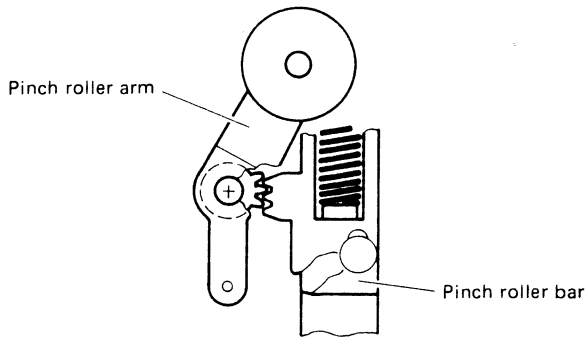


Fig. 2-5 Pinch roller arm

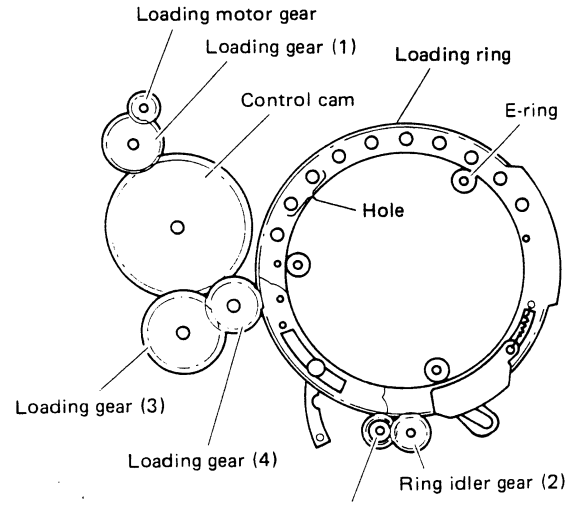


Fig. 2-6 Loading gear (3)

2.5.3 Loading gear and loading ring assemblies

Set to the mechanical Stop mode before removing or replacing the loading gear and loading ring assemblies.

1. Turn the take-up and supply loading rings in the unloading direction so that the 2nd and 3rd holes and teeth of the take-up and supply loading rings overlap each other. Use care not to apply excessive force.
2. Install the rings in this configuration. At this time, it may be easier to secure one of the three E-rings completely first (see Fig. 2-6).

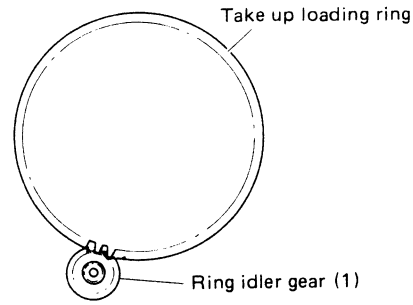


Fig. 2-7 Loading ring

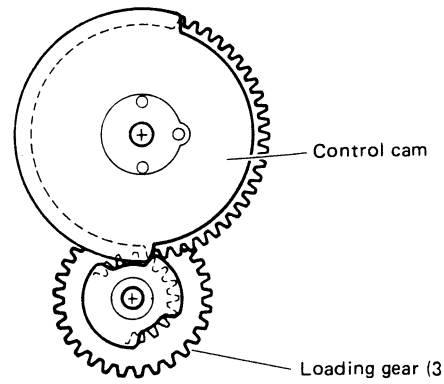


Fig. 2-8 Loading gear (3)

3. Mount ring idler gear (1) as indicated in Fig. 2-7.
4. Install ring idler gear (2). If it cannot be installed smoothly, turn the unloading ring slightly clockwise to permit installation.
5. Adjust the control cam for the Stop mode position. (See Fig. 2-4) Set the larger wedge of loading gear (3) toward the loading ring. Confirm that the edge of the smaller wedge contacts the edge of the control cam wedge as illustrated in Fig. 2-8. If necessary, turn the mode control motor slightly clockwise to allow easier installation of loading gear (3).
6. Install loading gear (4) with its teeth engaged with loading gear (3) and the take-up loading ring. (See Fig. 2.6) At this time, the marked teeth of loading gear (4) should be at roughly the 3 o'clock position and engaged evenly with the take-up loading ring.
7. Repeat loading and unloading operations several times. Confirm that the marked teeth of loading gear (4) come to correct position with respect to the loading ring and that mechanical operation is normal.
8. If mechanical operation is incorrect, again perform reassembly. Use care not to damage loading gear (1).

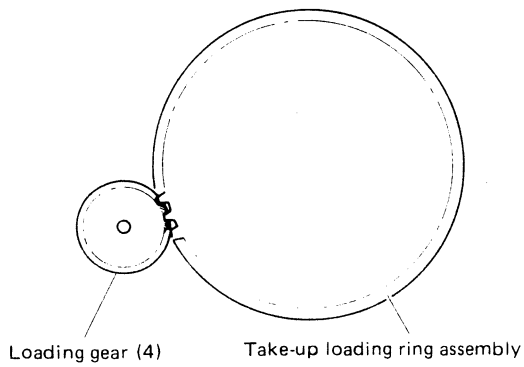


Fig. 2-9 Loading gear (4)

2.5.4 Middle pole

1. During loading, between the time the take-up pole base passes the middle pole and contacts the V notch of the drum base, confirm that the middle pole rests symmetrically in the notch of the middle pole stopper.
2. After completion of loading, operate the tape transport. Observe that the tape is not pinched between the V notch of the drum base and the guide roller.
3. During unloading, confirm that the pole base passes the middle pole without snagging.
4. During loading and unloading, observe pole base and middle pole timing, and confirm absence of tape slack and other incorrect operation. Also confirm absence of tape edge damage when it is being wound about the drum.

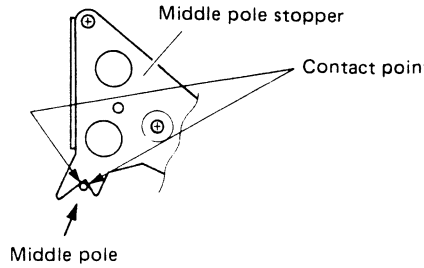


Fig. 2-10 Middle pole stopper

2.5.5 Tension pole position adjustment

1. Set for the Play mode at the beginning to midway portion of the tape.
2. As shown in Fig. 2-11, three lines are marked on the full erase head arm. Turn screw (1) to align the edge of the tension pole flange with the outermost of the three lines. Turn the screw clockwise to shift the tension pole in direction A and counter-clockwise for direction B.
3. Use the cassette torque meter and set for the Play mode. The right gauge of the meter indicates take-up torque and the left gauge shows back tension. Confirm readings of 40 to 75 gf. cm and 15 to 24 gf. cm respectively for the right and left gauges.
   If outside of specifications, check the tension pole position and if necessary, replace the tension band (section 2.4.3). Severe variation may necessitate replacing the reel disk (section 2.4.2).
4. After adjustment, eject cassette and apply screw sealant to screw (1).

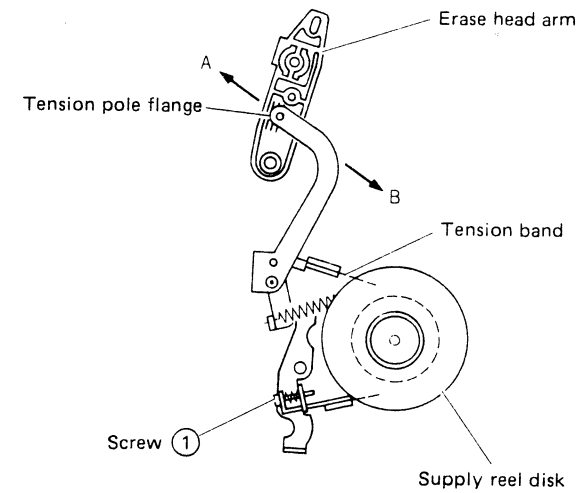


Fig. 2-11 Tension pole

2.6 TAPE TRANSPORT SYSTEM CHECKS AND ADJUSTMENTS

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following check is therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

2.6.1 Guide rollers

Guide roller height adjustment is required in order to attain FM waveform linearity at the drum input and output sides during interchangeability adjustments. To adjust guide roller height, loosen the setscrew (0.89 mm hex) and turn the guide roller with a flat blade screwdriver.

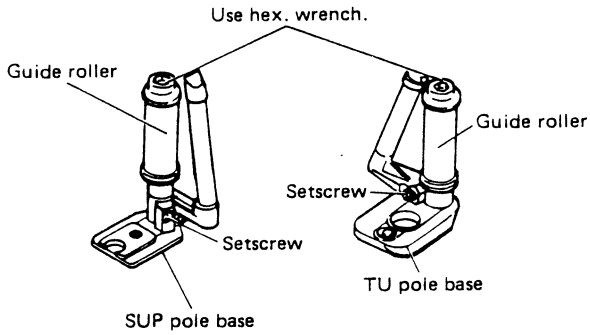


Fig. 2-12 Guide roller

Use a spare cassette (not Alignment tape) and while the tape is running, inspect visually for smooth transport at the drum input side and along the drum lead channel. If necessary, adjust the supply guide roller height.

Inspect the tape transport at the drum output side and if necessary, adjust the take-up guide roller height.

2.6.2 Supply guide pole

This guide pole serves to improve tape transport stability between the cassette output and drum input by maintaining the required height.

After adjusting the supply guide roller, this is adjusted to obtain smooth tape transport at the lower flange of the guide pole.

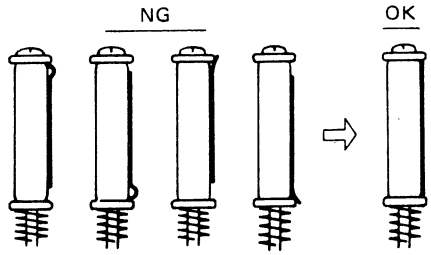


Fig. 2-13 Guide pole

2.6.3 Audio/control head inclination (take-up guide pole)

This is a vital adjustment for interchangeability. After adjusting the take-up guide roller, observe the tape transport at the lower flange of the take-up guide pole. Use a cross-head screwdriver and turn screw (B) counter-clockwise to where wrinkles begin to appear in the tape at the lower flange.

Then gradually turn the screw (B) clockwise to the point where the wrinkles no longer appear.

Azimuth and height of the audio/control head are adjusted during interchangeability adjustments.

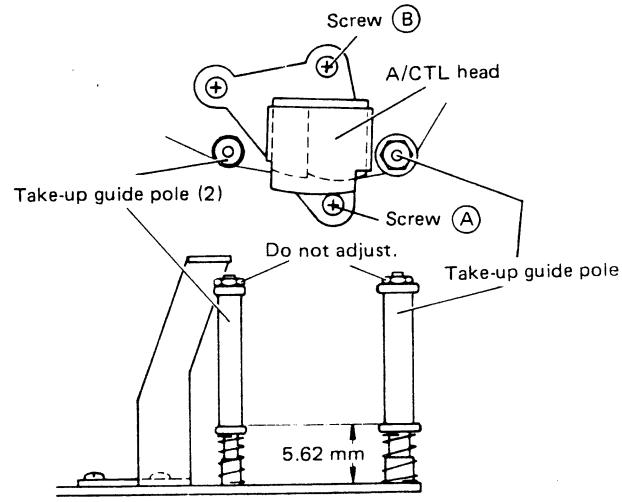


Fig. 2-14 A/CTL head

2.7 INTERCHANGEABILITY CHECKS AND ADJUSTMENT

Before using costly Alignment tape, use a spare cassette and confirm proper tape transport without damage to the tape. If a discrepancy is noted, make sure eliminate the cause of improper tape transport.

2.7.1 FM waveform

The FM waveform checks and adjustments are performed using the stairstep signal of the MH-C2 Alignment tape. Connect an oscilloscope to TP13 of the Y/C board and trigger the oscilloscope externally with the signal from TP11 of the Y/C board.

1. Play the MH-C2 Alignment tape and adjust the tracking for maximum FM output. With the maximum taken as (a), the minimum center output as (b), the minimum at the drum input as (c) and the minimum at the drum output as (d), confirm the following relationship.

$$\frac{b}{a} \geqq 0.7 \quad \frac{c}{a} \geqq 0.5 \quad \frac{d}{a} \geqq 0.5$$

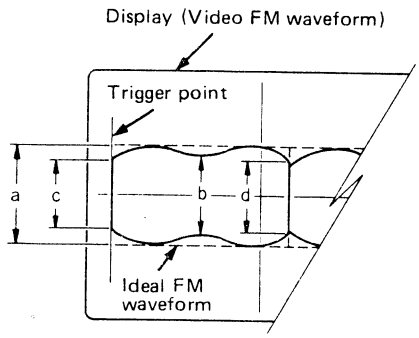


Fig. 2-15 FM waveform

2. Operate the tracking control and vary the FM waveform from maximum to minimum, then from minimum to maximum. Observe the waveform portion corresponding to the drum input and confirm essentially parallel variation. However, if the variation is in a see-saw pattern, the supply guide roller height requires adjustment.

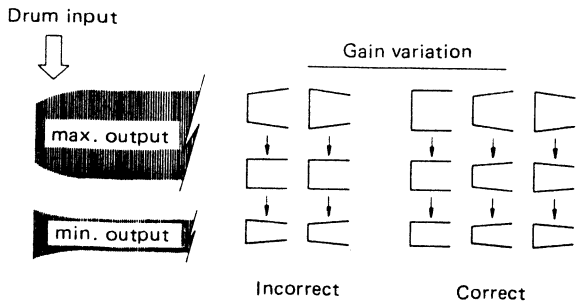


Fig. 2-16 Input FM waveform variation

In other words, the tape is not properly following the drum lead at the drum input side. Adjust the supply guide roller height so that the variation is as parallel as possible.

3. Similarly, observe the FM waveform portion corresponding to the drum output and if necessary, adjust the take-up guide roller height so that the variation is as parallel as possible.

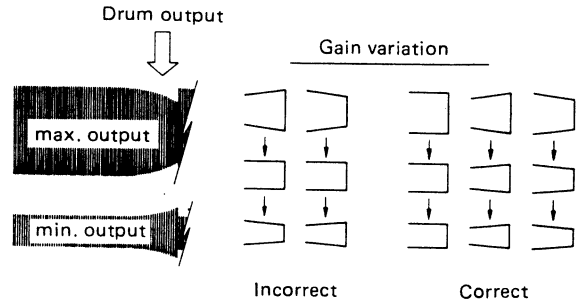


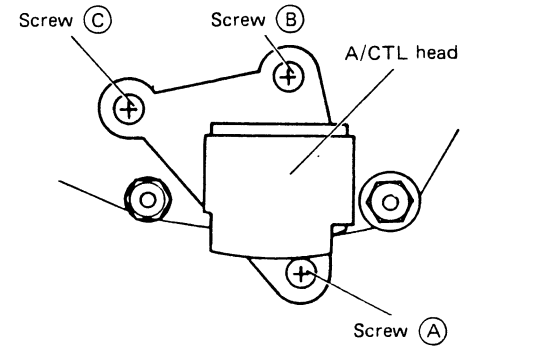
Fig. 2-17 Output FM waveform

4. Next, observe the entire FM wavefrom. So that the overall variation is as parallel and linear as possible, carefully adjust both guide rollers.
5. Play back the alignment tape CH-C5L and check the above item 4. again.
6. Adjust so that tape does not ride up on the flange during loading, shift from Search REW to Play, and When the tension pole is engaged.
   If wrinkles or creases are observed at the take-up guide pole, adjust the audio/control head inclination with attention to the tape transport at the lower flange of the pole.

2.7.2 Audio/control head adjustment

Incorrect position of the audio/control head reduces the play-back audio output, impairs S/N and in severe cases, interferes with servo stability due to inability to pickup the control signal.
Observe the audio signal waveform by connecting an oscilloscope to TP302 of the MAIN board or directly to the audio output terminal.

1. Play the stairstep (audio 6 kHz) section of the MH-C2 Alignment tape.
2. Adjust the azimuth by turning screw Ⓒ for maximum audio output.
3. Adjust the height by turning screws Ⓐ , Ⓑ and Ⓒ by small and equal increments (about 45°) at a time for maximum audio output.



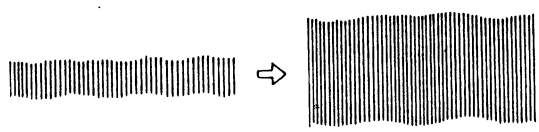


Fig. 2-18 A/CTL head adjustment

4. Again check the FM waveform. If acceptable, carefully tighten the setscrews of the guide rollers. Since this may disturb the FM waveform, check again after tightening the screws.

Note: Precisely adjust 2.7.1 and 2.7.2 (simultaneously).

2.7.3 Control head phase

Perform after adjusting SP/LP control delay MMV and tracking preset. Observe the FM waveform by connecting an oscilloscope to TP13 of theY/C board. Trigger the oscilloscope externally with the signal from TP11 of the Y/C board and set the slope to minus (−) to observe the CH1 waveform. Set the tracking control to the center click position.

1. Play the stairstep section of the MH-C2 Alignment tape.
2. Slightly loosen screws Ⓓ and Ⓔ of the audio/control head. Place the A/CTL head positioning tool over screw Ⓓ with the pin of the tool inserted in the adjustment hole near the screw.
3. Turn the tool counter-clockwise to position the audio/control head fully toward the capstan side.
4. Gradually turn the tool clockwise while observing the FM waveform. At the first output peak, stop turning and immediately tighten screw Ⓔ . Then tighten screw Ⓓ .

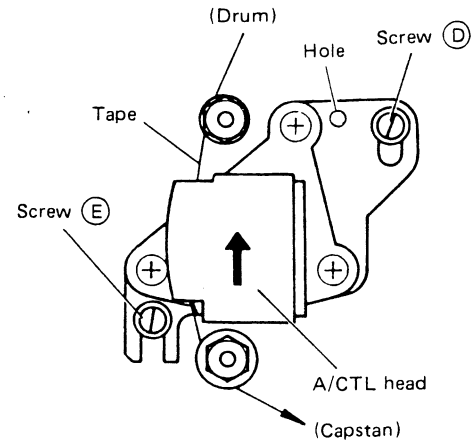


Fig. 2-19 Control head phase

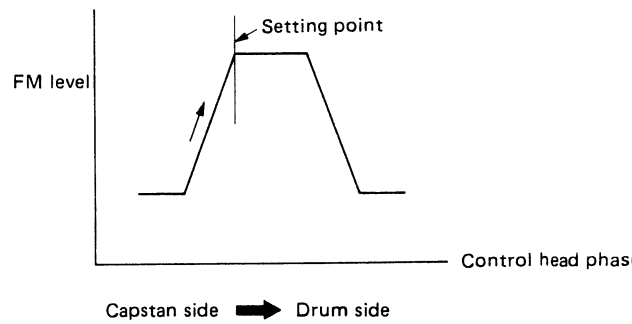


Fig. 2-20 Control head phase

5. Play back the alignment tape CH-C5L, and turning the tracking volume control confirm that FM waveform becomes maximum at the center click position.

2.7.4 Finel checks

1. Supply a video or TV signal input, record and play-back. Confirm that the FM waveform conforms to the video FM waveform specifications (SP and LP modes).
2. Refer to Electrical Adjustments and perform overall checks and adjustments of the servo, video and audio circuits.

2.8 MICROCHECKER INSTRUCTIONS

1. The Microchecker is employed for adjusting eccentricity of the upper drum (to within 2 microns).
2. Handling cautions
   1) This is a high precision instrument which must not be dropped or subjected to strong shock or vibration.
   2) Do not apply strong force to the test probe.
   3) The outer dial can be turned in the range of about 7 scale divisions. Do not apply strong force (exceeding 300 gcm) when turning.
3. Construction (See Fig. 2-8-1)

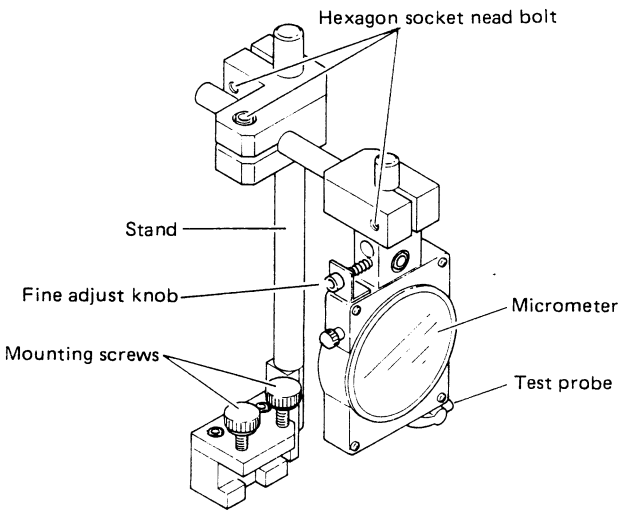


Fig. 2-8-1 Construction

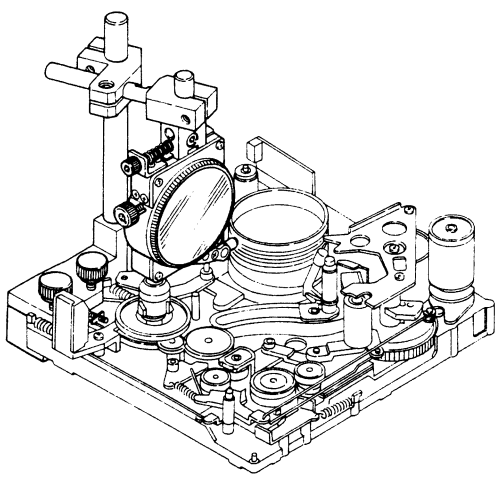


Fig. 2-8-2 Mounting

4. Preparation
   1) With the cassette housing in the lowered position, supply power. Press the Play button and carefully observe the pole base movement. Again press the Play button and cut the power at the point the pole base is positioned farthest from the cassette housing (to avoid interference with the Microchecker).
   2) Remove the cassette housing and clean the upper drum.
   3) Turn the fine adjust knob of the Microchecker counter-clockwise.
   4) Unscrew the two mounting screws sufficiently to allow mounting, then attach the Microchecker top the main deck as shown in Fig. 2-8-2. Observe that the bracket is perpendicular to the main deck. Use care that the Microchecker (especially the test probe) does not contact the video heads.

   IMPORTANT: Do not supply power after mounting the Microchecker.

   5) Confirm that the Microchecker is properly positioned. The test probe should be 2 to 5 mm from the top edge of the upper drum (but not contacting a groove).

      Also, the test probe should be pointed toward the center of the drum as shown in Fig. 2-8-2. If necessary loosen the bolt and adjust.
5. Eccentricity measurement
   1) Turn the fine adjust knob clockwise to where the probe contacts the upper drum. Then turn the outer dial to set the scale to an easily observed indication (e.g., zero). The outer dial turns in the range of about 7 scale divisions.
   2) Very carefully turn the upper drum without applying pressure to it (use a non scratching object such as a drinking straw or toothpick to turn the drum). Confirm needle deflection within 2 microns.
   3) If deflection is greater than 2 microns, the upper drum position must be adjusted.
   4) Turn the fine adjust knob to separate the test probe from the upper drum. Loosen the 2 securing screws of the upper drum and carefully correct the upper drum position within the screw tolerances. Tighten the securing screws.
   5) Repeat measurement and adjustment as necessary to where deflection is within 2 microns.
6. Final checks
   1) Turn the fine adjust knob to separate the test probe from the upper drum, then remove the Microchecker.
   2) Perform Interchangeability Checks and Adjustments as described in the Service Manual.

Notes:
1) PUJ94195 Microchecker Stand
2) PUJ96016 Micrometer
3) If the PUJ49712-2 Micrometer is available, it can be used with the PUJ94195 Microchecker Stand.

SECTION 3
ELECTRICAL ADJUSTMENTS

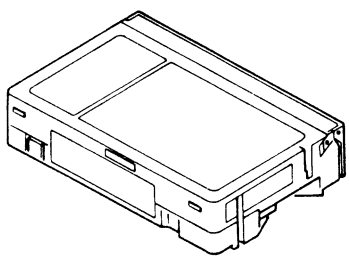
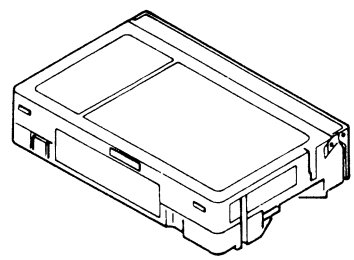
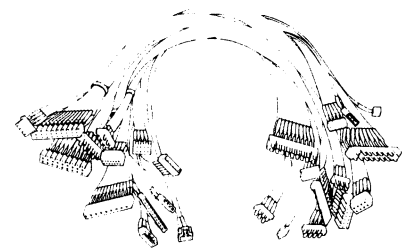
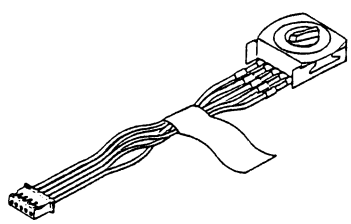
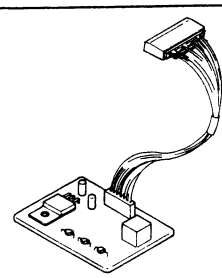
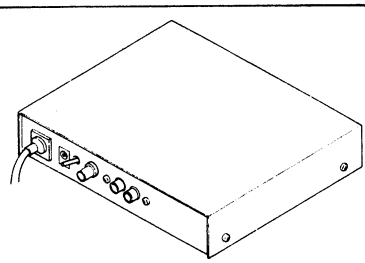
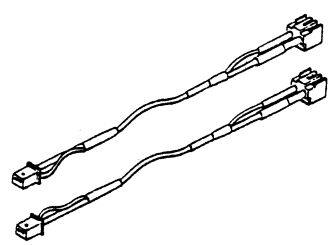
3.1 VTR ELECTRICAL ADJUSTMENTS

3.1.1 Precautions

Electrical adjustments are generally necessitated after replacing worn mechanical parts or video heads due to interrelationships among various electrical circuits.
In the event of malfunction, it is important to perform electrical system checks and adjustments methodically with the aid of proper test instruments.
During field service without a complete range of test equipment, avoid unnecessary disturbance of the internal control settings. Refer such repairs and adjustments to an authorized service center, or leave it to do servicing (factory service).

3.1.2 Required test equipment

1. Color monitor-TV
2. Oscilloscope
3. Signal generator (color bar and stairstep)
4. Frequency counter
5. Audio tester
6. Regulated DC power supply
7. Digital voltmeter
8. Blank video cassette tape (EC-30) for recording and playback checks
9. Alignment tape (MH-C2)
10. LP mode check tape (CH-C5L)
11. Patch cord (PUJ93991B)
12. Camera dummy (PUJ94192)
13. Test Mode checker (PUJ94194)
14. Standard electrical/electronic service tools

Alignment Tape (SP MODE) MH-C2	Check Tape (LP MODE) CH-C5L	Patch Cord PUJ93991B
		
Test Mode Checker PUJ94194	Camera Dummy PUJ94192	
		
Y/C Separator PUJ25579-2	Y/C Separator Cable PUJ94193	
		

• This fixture is not absolutely required for this model.

Table 3-1

3.1.3 Camera dummy

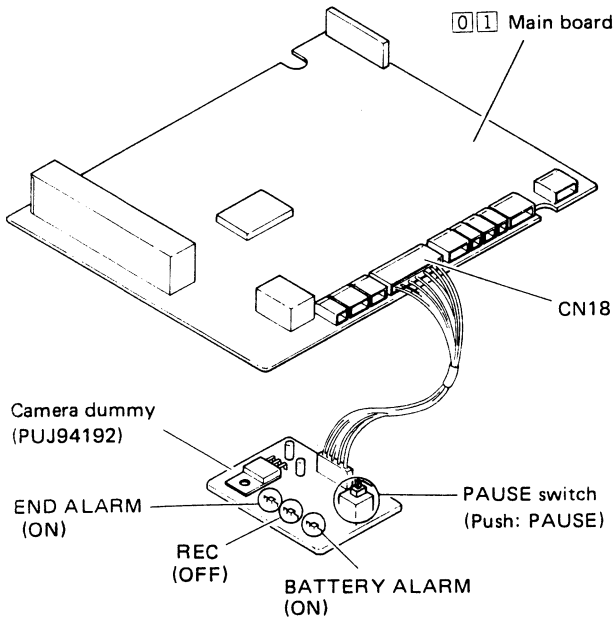


Fig. 3-1-1 Camera dummy connection

The camera dummy (PUJ94192) which is a test equipment for the exclusive use of this model is used when the VTR and camera portions of the VideoMovie are disconnected each other. Before putting to use the dummy, connect it to CN18 of the main board [01] with the cord.

- LEDs and switch

  END ALARM LED : Lights at tape end in REC mode.

  REC LED : Lights except REC.

  BATTERY ALARM LED: Lights when battery power becomes insufficient.

  PUAUSE switch : Pushing this switch with the REC/REC PAUSE switch depressed enters the deck into REC Pause mode.

Note: If the PAUSE switch is not depressed, the PAUSE button of the operation board is ineffective. Therefore, use this dummy with the PAUSE switch depressed except for REC mode.

3.1.4 External video signals (supplied from other implements than GR-C7)

(1) Since external input terminals are not provided to record an external signal, use the PUJ93991B Patch Cord, which includes the (Y) and (C) video input cables. Supply the video signal directly to Y/C PWB CN1 (Y IN) and CN2 (C IN). Although the E-E (Stop) picture may be disturbed, recording and play-back are not affected.

(2) Connection of Y/C separator

(Used only for E-E level adjustment according to camera input)

Connect the DC OUT cable of the Y/C separator to the deck section of GR-C7 and supply 9.6 V DC to the Y/C separator's DC IN from the AC power adapter (AA-V2 or equivalent) as shown in Fig. 3-1-2.

Next, connect the Y/C separator's attached cables as described below; cable with red terminal to the C OUT and another with white terminal to the Y OUT, and then, connect the cable from the signal generator (color bar) to the Y/C separator's VIDEO IN terminal.

Then, connect the Y/C separator adapter cables between the attached cables and the Y/C board.

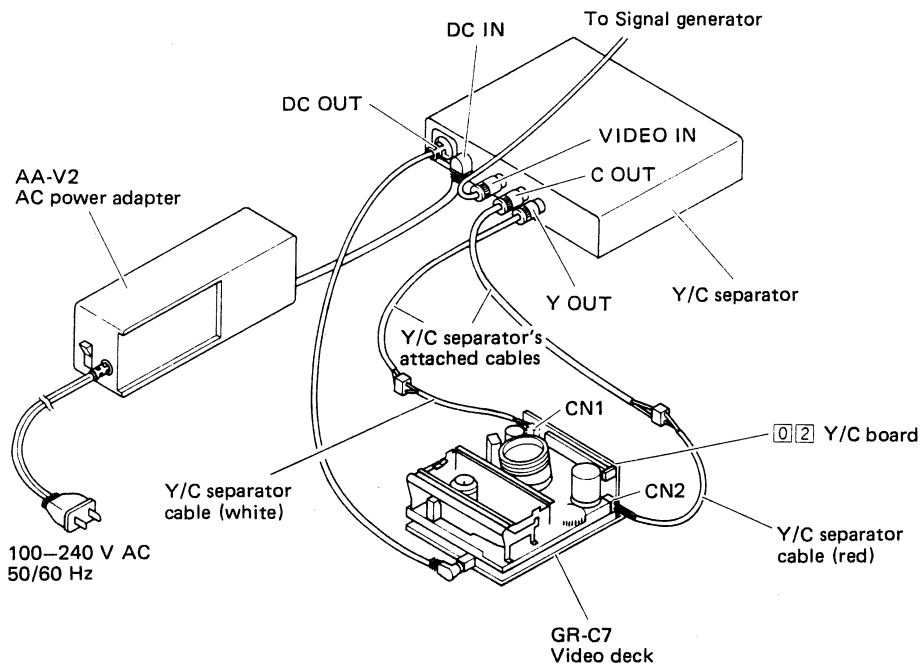


Fig. 3-1-2 Connection of Y/C separator

3.1.5 Location of adjustment parts

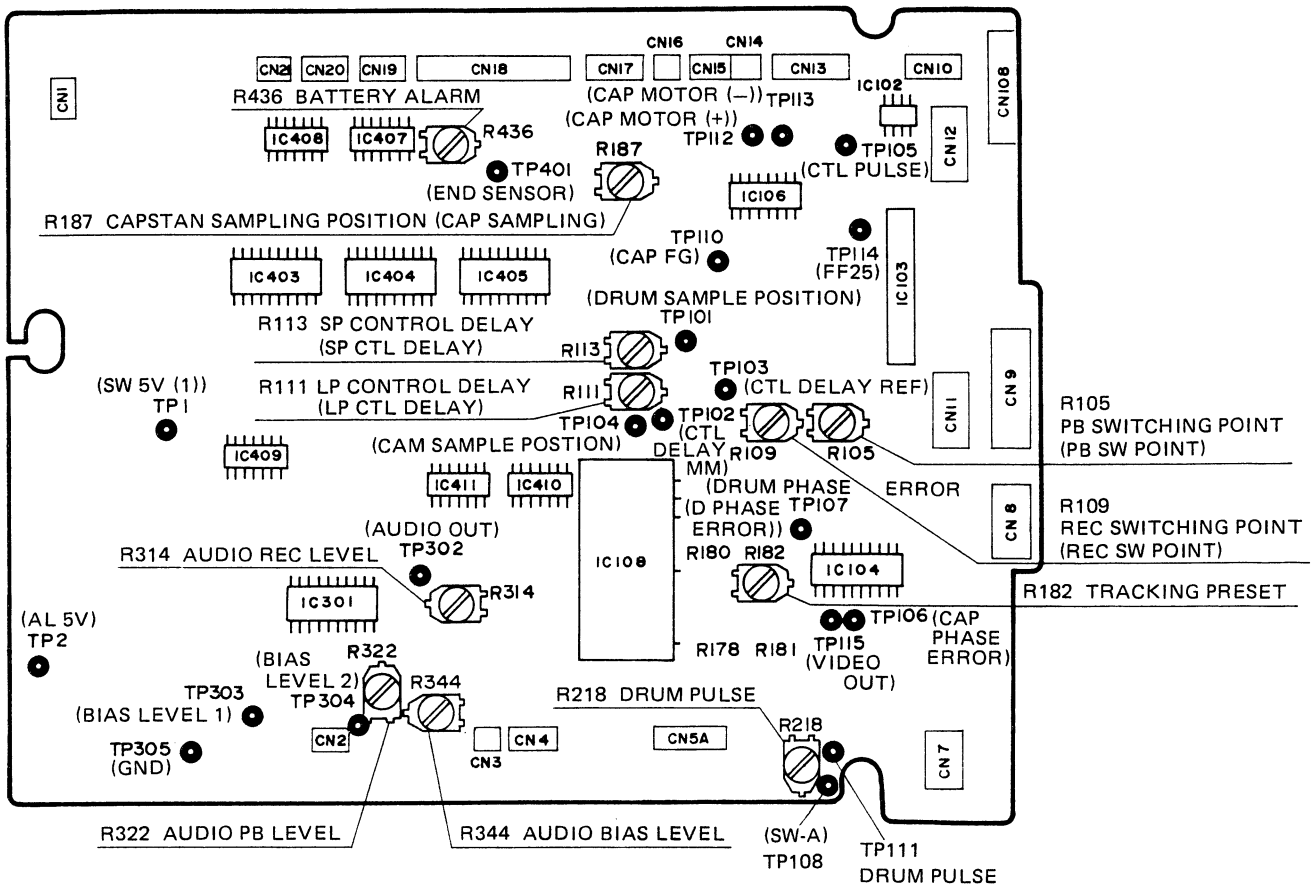


Fig. 3-1-3 [0][1] Main board adjustments location

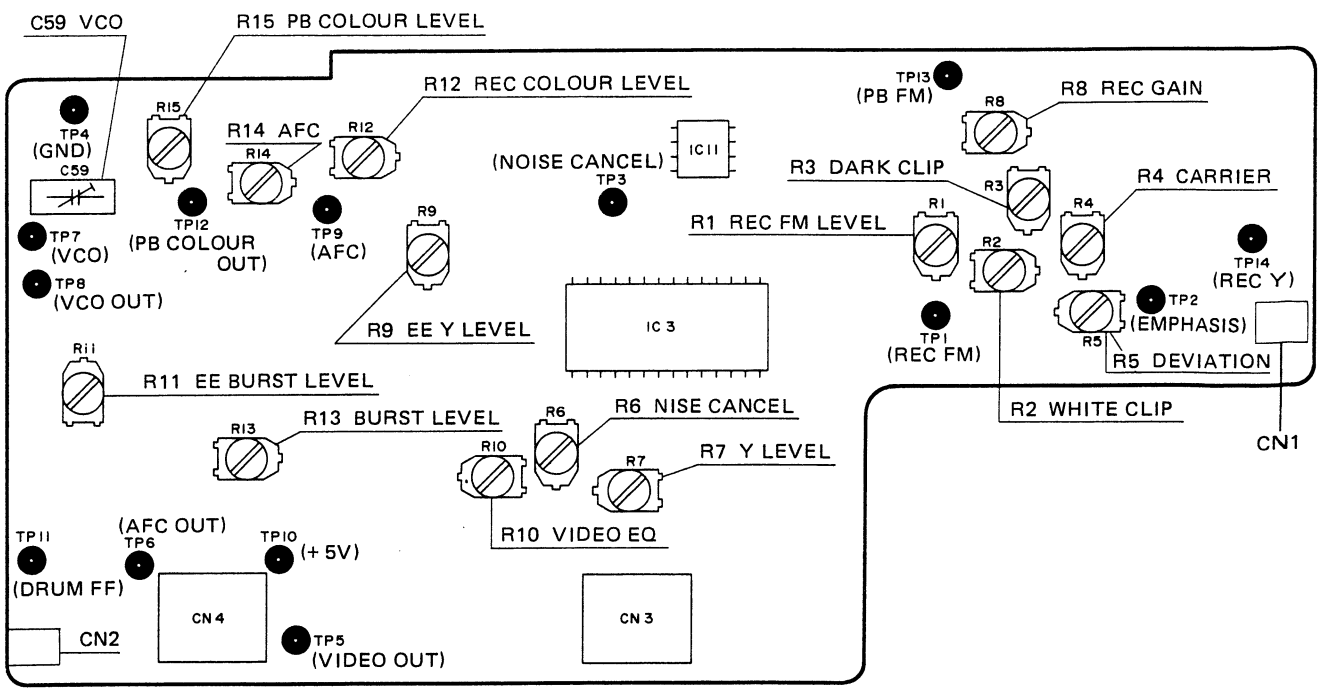


Fig. 3-1-4 [0][2] Y/C board adjustments location

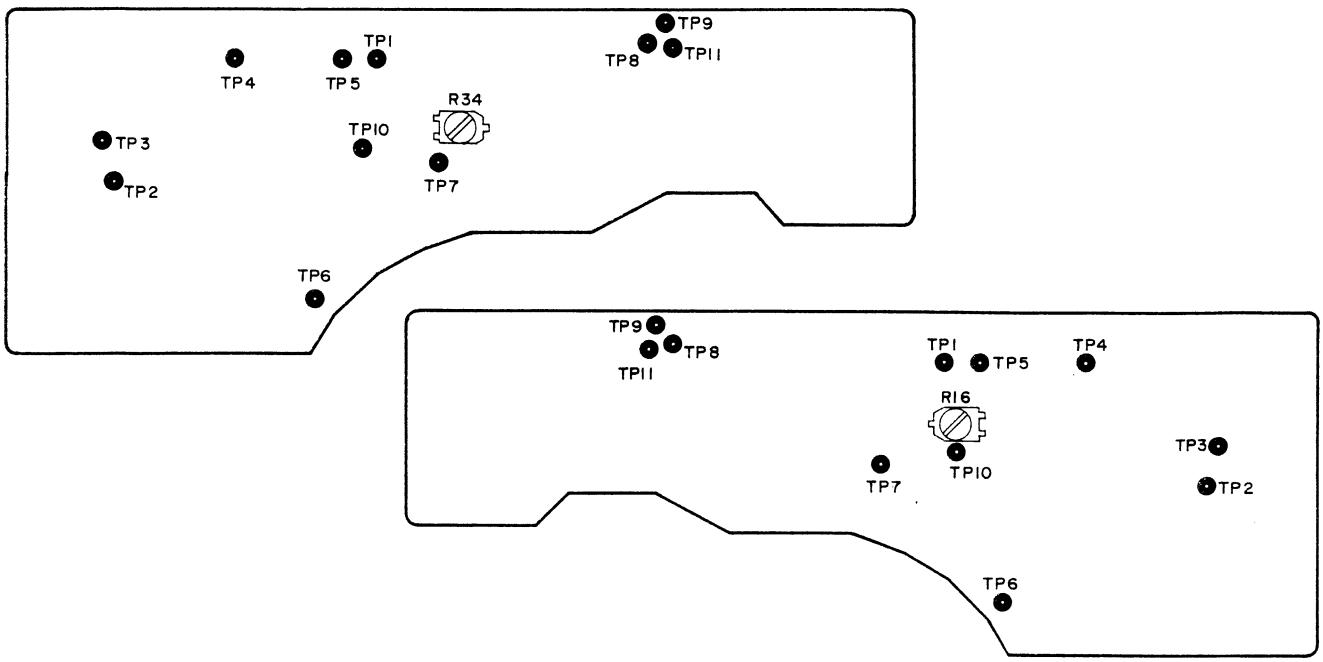


Fig. 3-1-5 [1][2] S. Jump board adjustments location

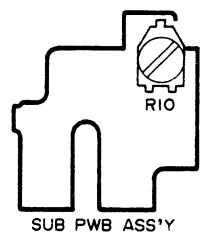


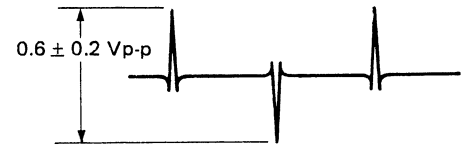
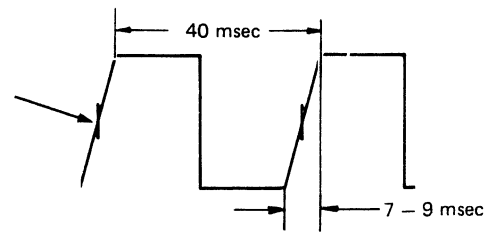
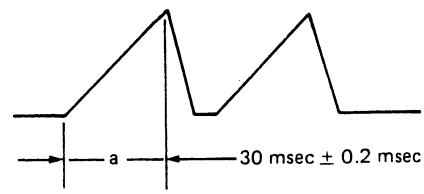
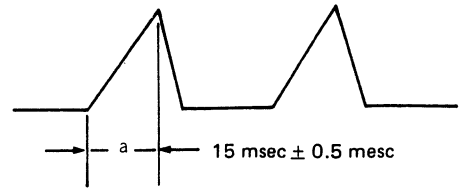
Fig. 3-1-6 SUB board adjustment location

3.2 SWITCHING REGULATOR AND MECHACON CIRCUITS

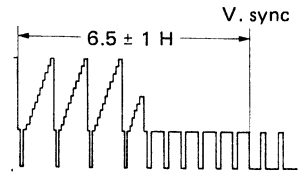
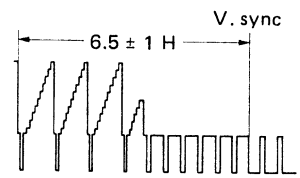
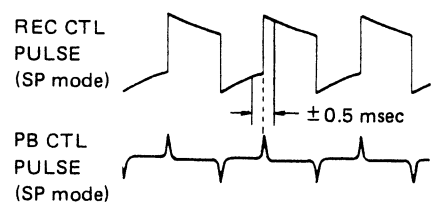
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
1	Battery Alarm	• REC mode • DC 9.2 V to BATT terminal • BATT terminal	IC404 pin 6 [0][1] MAIN Battery alarm indication in LCD counter.	R436 [0][1] MAIN	1) In REC mode, supply 9.2 V DC to the BATT terminal. 2) Connect the oscilloscope to pin 6 of IC404 and turn R436 to the position that potential changes from Low to High. (Oscillation is observed at the changing point.) 3) Confirm that the battery alarm display of the tape counter starts blinking.
2	Battery Stop	• REC mode without input signal • 12 V → 8.8 ± 0.1 V at BATT terminal	Operation check		1) In REC mode, power is turned off when power voltage is varied from 12 V to 8.8 ± 0.1 V.

Note: When not otherwise indicated, perform adjustment in SP mode.

3.3 SERVO CIRCUIT

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
1	Drum Pulse	• REC	TP111 (DRUM PULSE) [0][1] MAIN	R218 [0][1] MAIN	1) Connect the oscilloscope tp TP111, and adjust R218 so that pulse (Fig. 3-3-1) becomes 0.6 V ± 0.02 Vp-p.  Fig. 3-3-1
2	Capstan Sampling Position	• Play MH-C2 • Stairstep	TP106 (CAP. PHASE ERROR) [0][1] MAIN TP104 (CAP. SAMPLE POSITION) [0][1] MAIN	R187 [0][1] MAIN	1) Connect the digital voltmeter to TP106, and adjust R187 to obtain 2.45 V ± 0.1 V. 2) Connect the oscilloscope to TP104, and confirm a stable sampling pulse positioned nearly at the center of the rising slope of the trapezoidal waveform.  Fig. 3-3-2
3	LP Control Delay MMV	• E-E mode • LP mode • Shortcircuit between TP1 (SW 5V[1]) & TP103 (CTL DELAY REF)	TP102 (CTL DELAY MMV) [0][1] MAIN	R111 [0][1] MAIN	1) Short TP1 and TP103. 2) Connect the oscilloscpe to TP102, and set for LP mode. 3) In Stop mode, adjust R111 so that (1) (period between the beginning of rising and the peak of the waveform) becomes 30 msec.  Fig. 3-3-3
4	SP Control Delay MMV	• E-E mode • Shortcircuit between TP1 (SW 5V[1]) & TP103 (CTL DELAY REF)	TP102 (CTL DELAY MMV) [0][1] MAIN	R113 [0][1] MAIN	1) Short TP1 and TP103. 2) Connect the oscilloscope to TP102, and set for SP mode. 3) In Stop mode, adjust R113 so that (a) (period between the beginning of rising and the peak of the waveform) becomes 15 msec.  Fig. 3-3-4

Note: When not using the Y/C Separator for video circuit adjustment, use the camera video signal.

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
5	PB Switching Point	• Play MH-C2 • Stairstep • (–) trigger • Tracking VR at center click position	TP115 (VIDEO OUT) [0][1] MAIN TP11 (FF25) EXT. TRIGGER [0][2] Y/C	R105 [0][1] MAIN	1) Connect the oscilloscope to TP115 of [0][1] MAIN board and trigger it with signal from TP13 in playing back teh MH-C2 tape. 2) Set the oscilloscope to trigger externally with minus (–) slope signal. 3) Adjust R105 so that the trigger point becomes 6.5 H prior to the V. sync.  **Fig. 3-3-5**
6	REC Switching Point	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • REC mode • (–) trigger • Tracking VR set at center click position	TP115 (VIDEO OUT) [0][1] MAIN TP13 (FF25) EXT. TRIGGER [0][1] MAIN	R109 [0][1] MAIN	1) With the unit in REC mode, connect the oscilloscope to TP115 and trigger it externally with signal from TP114 of [0][1] MAIN board. 2) Set the oscilloscope for externally triggering with minus (–) slope signal. 3) Adjust R109 so that the trigger point becomes 6.5 ± 1 H prior to the V. sync.  **Fig. 3-3-6** 4) Playback the recorded portion, and confirm that switching point is 6.5 ± 1 H.
7	Tracking Preset	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • Self REC/PB • Tracking VR set at center click position	TP105 (CTL PULSE) [0][1] MAIN TP11 (FF25) EXT. TRIGGER [0][2] Y/C	R182 [0][1] MAIN	1) Connect the oscilloscope to TP105 and TP13 to which it triggers externally, and set the unit to REC mode. 2) Play-back recording of (1). Adjust R182 to align the TP105 waveform rise during Recording with the TP105 positive pulse during Play-back.  **Fig. 3-3-7 (a)**

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
		• LP mode			3) Perform the same procedure as steps 1) and 2) above in LP mode so that the waveform becomes as shown in Fig. 3-3-7(b).

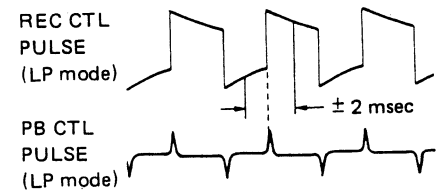


Fig. 3-3-7 (b)

3.4 Y/C AND PRE-AMPLIFIER CIRCUITS

Notes:

- **Be sure to perform the steps 1 through 4 after replacing the heads and/or the pre-amplifier.**
  If the drum assembly is replaced, only the checking procedure of the step 1 (fo/Q adjustment) is needed (adjustment is unnecessary).
- **Before proceeding to adjustment of the recording system, make sure to perform E-E level adjustment.**
- **Perform adjustment of the playback system prior to adjusting carrier and deviation.**
- **Table 3-4-1 shows standard adjustment sequence.**
  In practice, perform only those steps that become necessary.

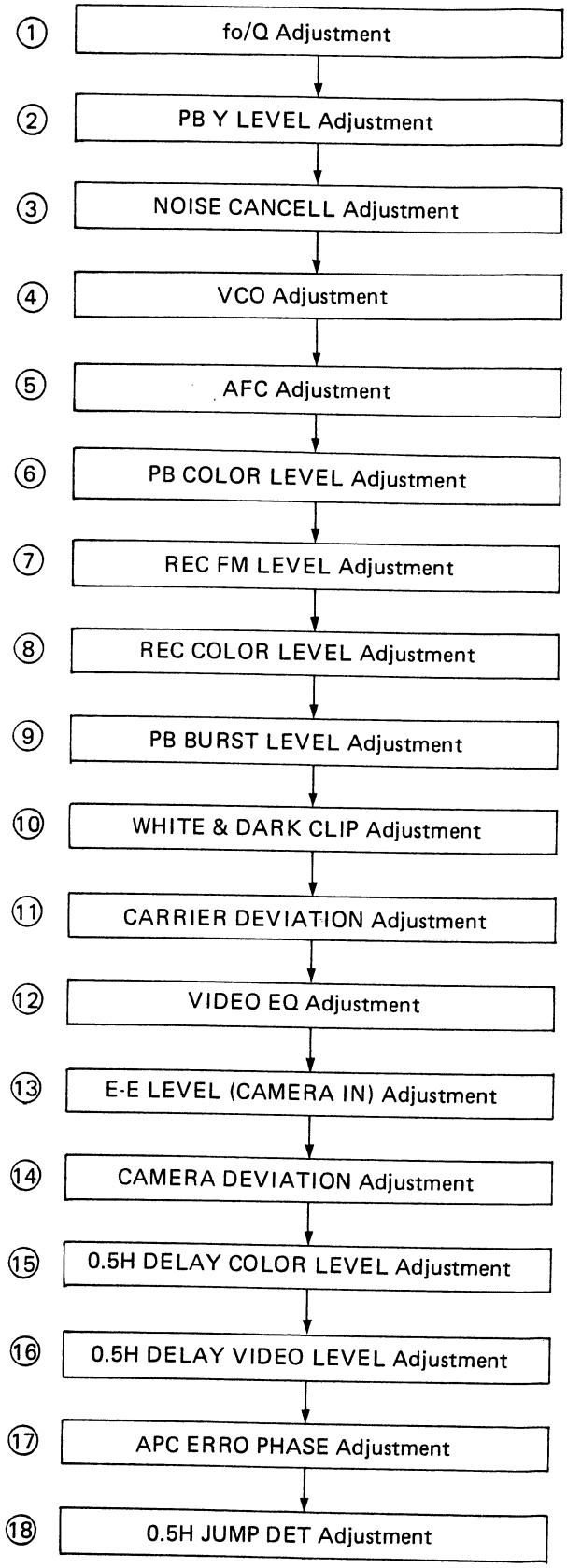


Table 3-4-1 Standard adjustment sequence of the video circuit

[Y/C]

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
1	fo/Q Adj.	• Perform this adjustment only if image reversal ("tearing") or horizontal jitter occurs during REC/PB of scenes with strong light/dark contrast after replacing the heads or preamp.			
		• Play MH-C2 • RF sweep	TP6 (PB FM) [0][2] Y/C	CH-1: C2(fo), R2(Q) CH-2: C4(fo), R4(Q) CH-3: C1(fo), R1(Q) CH-4: C3(fo), R3(Q) [0][3] PRE AMP	1) For more easily observing the waveform, adjust R2 (CH-1 Q) for maximum output in the 4.2 MHz region. 2) Adjust C2 (CH-1 fo) to set the resonance point to 4.2 MHz. 3) At this time, make a note of the 4.2 MHz and 1 MHz ratio (Q value).
					4) Repeat steps (1) through (3) for CH-2 to CH-4. 5) At the ratio of (3), adjust each fo to that of the least effecient channel.
2	PB Y Level	• Play MH-C2 • Color bar	TP5 (VIDEO OUT) [0][2] Y/C	R7 [0][2] Y/C	1) Connect the oscilloscope to TP5. Adjust R7 so that Y level at TP5 becomes 2 V ± 0.1 Vp-p.
3	Noise Cancel	• Play MH-C2 • Color bar	TP3 (NOISE CANCEL) [0][2] Y/C	R6 (NOISE CANCEL) [0][2] Y/C	1) Observing the oscilloscope connected to TP3, adjust R6 to minimize the noise level.
4	VCO Adj. (4.43 MHz)	• Play MH-C2 • Color bar	TP8 (VCO) [0][2] Y/C	C59 [0][2] Y/C	1) Connect a 30-kohm resistor between TP4 (GND) and TP7 of the Y/C board. 2) Connect the frequency counter to TP8 and adjust C59 to obtain 4.433619 MHz ± 50 Hz of the frequency.

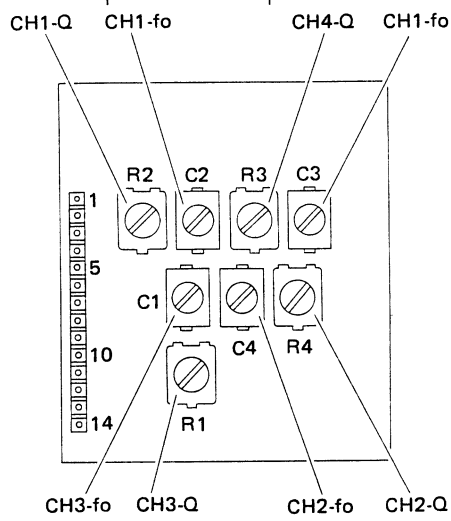


Fig. 3-4-1 Pre-amplifier adjustments location

Note: External trigger
CH1 : Pin 4
CH2 : Pin 3
CH3 : Pin 7
CH4 : Pin 6
of CN-7 in Main Board

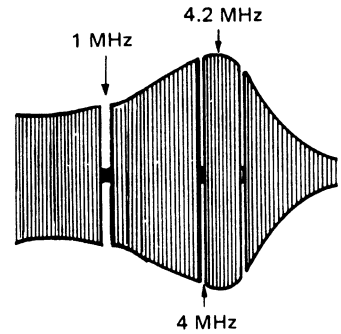


Fig. 3-4-2

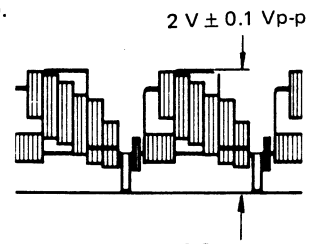


Fig. 3-4-3

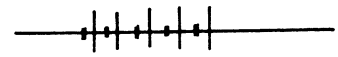


Fig. 3-4-4

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
5	AFC	• Play MH-C2 • Color bar • 2.5 V DC to TP10	TP6 (5.15 MHz) [0][2] Y/C	R14 [0][2] Y/C	1) Supply regulated 2.5 V DC to TP10 (or connect the test instrument shown in Fig. 3-4-5 to TP4, TP9 and TP10). 2) Connect the frequency counter to TP6. 3) Adjust R14 to obtain 5.15 MHz ± 100 kHz frequency at TP6.
6	PB Color Level	• Play MH-C2 • Color bar	TP12 (PB COLOR) [0][2] Y/C	R15 [0][2] Y/C	1) Connect the oscilloscope to TP12 and adjust R15 so that the maximum signal level becomes 0.2 Vp-p. (At this time, observe waveforms of CH-1 through CH4 respectively.)
7	REC FM Level	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • SP mode • REC mode	HEAD TERMINAL (Orange wire) [0][4] PRE AMP	R1 [0][2] Y/C	1) Connect the oscilloscope to the Head terminal and adjust R1 so that the level (a) becomes 1.5 Vp-p.
8	REC Color Level	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • Self REC & PB	TP12 (PB COLOR) [0][2] Y/C	R12 [0][2] Y/C	1) Connect the oscilloscope to TP12. 2) In recording, adjust R12 so that the largest level among CH-1 through CH-4 is 0.15 Vp-p.

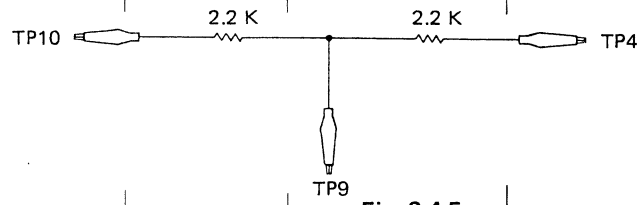


Fig. 3-4-5

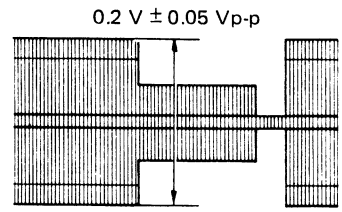


Fig. 3-4-6

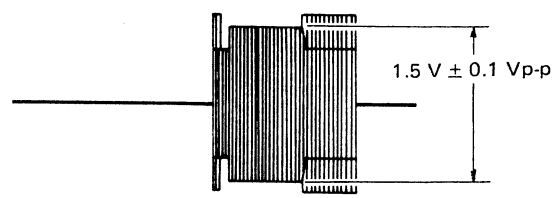


Fig. 3-4-7

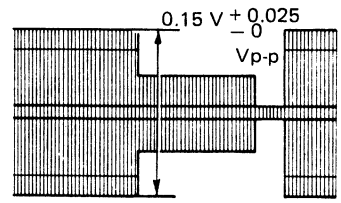
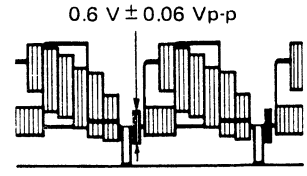
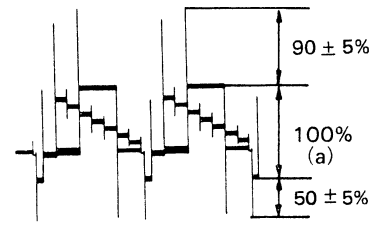
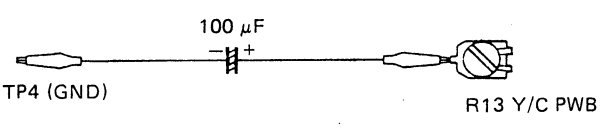
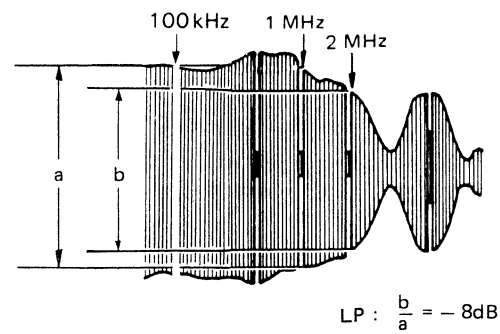
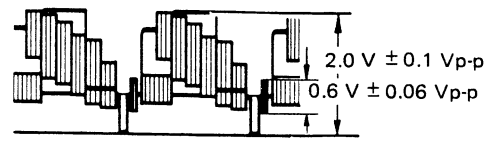
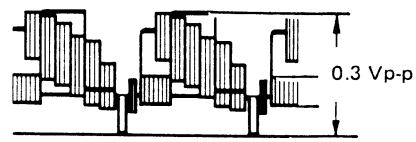


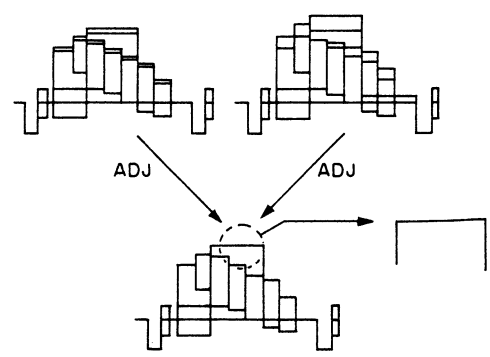
Fig. 3-4-8

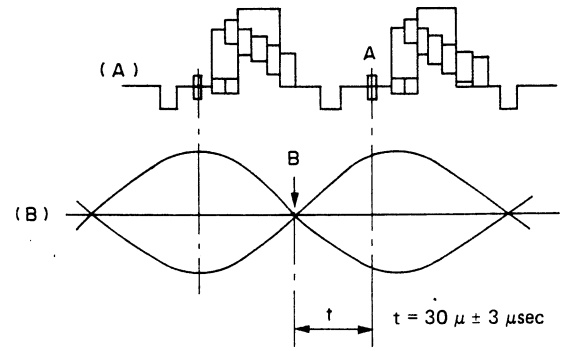
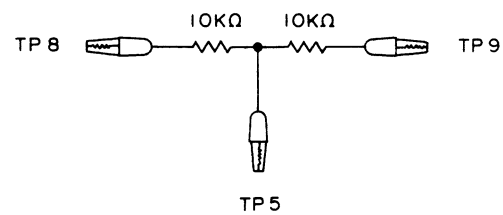
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
9	PB Burst Level	•Supply external video signal (color bar) to CN2 of the Y/C PWB. •Self REC & PB	TP5 (VIDEO OUT) [0][2] Y/C	R13 [0][2] Y/C	1) Connect the oscilloscope to TP5. Adjust R13 so that burst level at TP5 is 0.6 Vp-p.  Fig. 3-4-9
10	White & Dark Clip	•Supply external video signal (color bar) to CN2 of the Y/C PWB. • E-E mode	TP2 (EMPHASIS) [0][2] Y/C	R2 (WHITE CLIP) R3 (DARK CLIP) [0][2] Y/C	1) Observing the oscilloscope connected to TP2, adjust R2 and R3 so that white clip becomes 90% and dark clip becomes 50%, respectively.  Fig. 3-4-10
11	Carrier Deviation	• REC mode • No input signal	TP1 (REC FM) [0][2] Y/C	R4 (CARRIER) [0][2] Y/C R5 (DEVIATION) [0][2] Y/C	1) In recording whithout input signal, adjust R4 so that frequency at TP1 (counter display) becomes 3.8 MHz ± 50 kHz. 2) Record and play back the color bar signal. Connect the oscilloscope to TP5. 3) During recording, adjust R5 so that the Y level becomes 2 V ± 0.1 Vp-p during playback.
12	VIDEO EQ Adj.	•Supply external video signal (color sweep) to CN2 of the Y/C PWB. • LP mode • Self REC & PB	TP5 (VIDEO OUT) [0][2] Y/C	R10 [0][2] Y/C	1) Connect a 100 μF capacitor between TP4 (GND) and R13 the Y/C board to make a shortcircait shown in Fig. 3-4-11. 2) Set markers of the color sweep generator to 2 MHz and 100 kHz. 3) Record and Play-back a color sweep signal in the LP mode. Adjust R10 so that the 2 MHz level is more than –8 dB relative to 100 kHz.  Fig. 3-4-11  LP : $\frac{b}{a} = -8dB$ Fig. 3-4-12

[Camera]

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
13	E-E Level (Camera IN)	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • E-E mode	TP5 (VIDEO OUT) [0][2] Y/C	R9 R11 [0][2] Y/C	1) Connect the oscilloscope to TP5. 2) Adjust R9 so that Y level at TP5 becomes 2.0 Vp-p. 3) Adjust R11 to obtain 0.6 Vp-p of burst level at TP5.  Fig. 3-4-13
14	Camera Deviation	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • E-E mode	TP14 (REC Y) [0][2] Y/C	R8 [0][2] Y/C	1) Observing the oscilloscope connected to TP14 adjust R8 so that Y level becomes 0.3 Vp-p.  Fig. 3-4-14

[S. JUMP]

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
15	0.5H Delay Color level	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • Self REC & PB • Color bar	TP1 (0.5H Delay [1][2] S. JUMP	R10 [1][2] S. JUMP	1) Record and play-back color bar signal (SP mode). 2) Connect oscilloscope to TP1 of the S-JUMP PWB and make a note of level (A). 3) Short TP2 and TP3 to ground. Again observe the level (B) at TP1. 4) Adjust R10 so that levels A and B are equal.
16	0.5 H Delay Video level	• PLAY CH-C5L • Color bar	TP5 [0][2] Y/C	R34 [1][2] S. JUMP	1) Connect oscilloscope to TP5 of the Y/C PWB in playing back the CH-C5L tape. 2) Adjust R34 of the S-JUMP PWB to obtain th waveform illustrated in Fig. 3-4-15.  Fig. 3-4-15

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
17	APC Error Phase	• Supply external video signal (color bar) to CN2 of the Y/C PWB. • Self REC & PB	TP10 TP6 [1] [2] S. JUMP	L1 [1] [2] S. JUMP	1) Connect dual trace oscilloscope to TP10 and TP6. Adjust the core of L1 to obtain the burst phase (A) and 7.8 kHz waveform phase (B) indicated in the figure, t = 30 μ ± 3 μsec.  **Fig. 3-4-16**
18	0.5 H Jump Det	• E-E mode • No input signal	TP4 (0.5 H JUMP DET) [1] [2] S. JUMP	R16 [1] [2] S. JUMP	1) Supply regulated 2.5 V DC to TP5 (or connect the test instrument shown in Fig. 3-4-17 to TP8, TP9 and TP5). 2) Connect the frequency counter to TP4. 3) Adjust R16 to obtain 30 kHz ± 0.2 kHz frequency at TP4.  **Fig. 3-4-17**

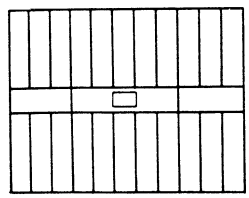
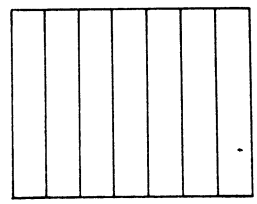
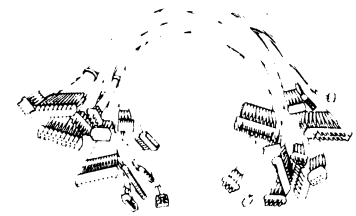
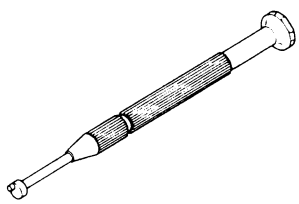
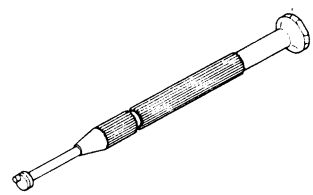
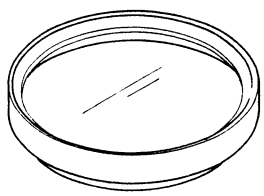
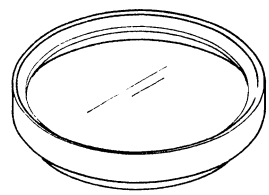
Note: Confirm that the playback mode is fulfilled with CH-C5L after campleting all adjustments.

3.5 AUDIO CIRCUIT

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
1	PB Level	• Play MH-C2 • Color Bar (1 kHz). • PB mode	TP302 (AUDIO OUT) [0] [1] MAIN	R322 [0] [1] MAIN	1) Connect the audio tester to TP302, and play the alignment tape MH-C2 (1 kHz). In the PB mode, adjust R322 to obtain –6 dBs (1.1 Vp-p) ± 0.5 dBs.
2	Audio Bias Level	• REC mode • No audio signal input	TP304 (BIAS LEVEL-2) TP303 (BIAS LEVEL-1)	R344 [0] [1] MAIN	1) Connect the audio tester's HOT side to TP303 and GND to TP304. 2) Adjust R344 so that bias level becomes 2.2 mV ± 0.2 mVrms.
3	REC Level	• SP mode • 1 kHz, -8 dBs input • Self REC & PB	TP302 (AUDIO OUT) [0] [1] MAIN	R314 [0] [1] MAIN	Druing Recording, adjust R314 so that the TP302 value is –6 ± 1 dBs during Play-back.

3.6 CAMERA ADJUSTMENT

3.6.1 Required tools and equipment for camera adjustment

Grey scale pattern (GS-2A) Reflection type, 11 steps, γ = 2.2	Color bar pattern (CC-2A) Reflection type, 7 colors	Patch cord (PUJ93991)
		
Back focus adjustment driver (PUJ37186A)	AF (auto-focus) unit, Back focus adjustment driver (PUJ37186B)	AF (auto-focus) unit, Back focus adjustment chart (PUJ93944)
		
Color temperature conversion filter (PUJ53340A - C2, C4, C8)	Neutral density filter (PUJ53341A - ND2, ND4, ND8)	Color compensating filter - CC10Y (CC10Y filter made by Kodak)
		This filter is CC10Y in Kodak.

3.6.2 Other tools and instruments necessary for adjustment

- Halogen lamps (3 200 K each) . . . . . 2 or more
- 9.6 V DC supply (AA-V2 or equivalent)
- Skin tone test pattern (of clear color phase)

3.6.3 Other measuring instruments

- Oscilloscope
- Vectorscope
- Color video monitor
- Digital voltmeter
- Lux meter
- Color temperature meter

3.6.4 Standard setting and connection

Separate the camera and deck portions each other, and connect them with patch cords.
For adjusting VRs of the E-E & IND board, pull the VIDEO, E-E & IND, and REG boards to this side prior to adjustments. At this time, pay careful attention to flexible wires not to damage them.
For adjusting VRs of the VIDEO board, there needs no pulling the board.

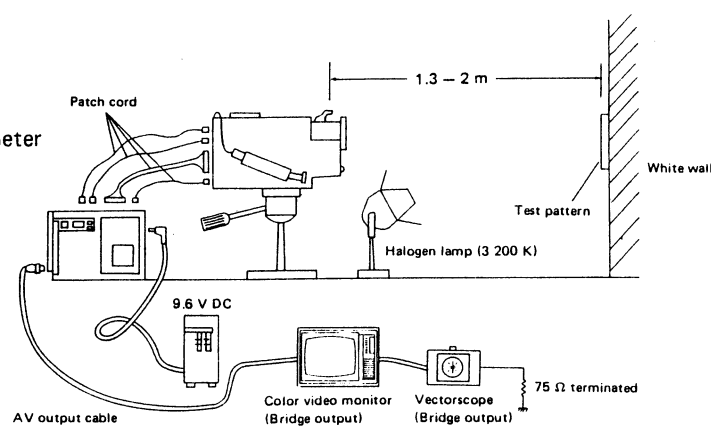


Fig. 3-6-1

3.7 PREPARATION AND PRELIMINARY CHECKS BEFORE CAMERA ADJUSTMENTS

3.7.1 Notice before adjustment

Electrical adjustments described in this article are generally needed in case of electrical parts replacement.
When it seems that there is any trouble in electric circuits, find the faulty by measuring instruments first, and then repair or replace the parts if necessary. Adjustments should be done only after completion of such checking. Don't turn control VRs without confirming the reason of the fault.
The following adjustment items and steps are for general servicing, therefore, perform only the necessary items in practice.

3.7.2 Preparation and check points

1. Test pattern illumination
   Proper illumination of the test pattern is essential for performing correct adjustment.
   Use 3200°K lights and set them to illuminate the test pattern evenly at approximately 4,000 Lux. (It is recommended to use two or more lamps.)
2. Test pattern
   Use the new and clean test patterns.
3. This model adopts the fully automatic color temperature sensing system. Any adjustment such as white balance adjustment relating to the system is remarkably effected by ray and light applied to the color sensor. Therefore, such adjustment must be done with the color sensor set to the enclosure. Pay careful attention to other lights (fluorescent light, etc.) than the proper pattern illumination.
4. It needs not to adjust VRs of the Imager board (1) and (2).
5. When not otherwise indicated, perform adjustment in the manual focus and indoor mode.
6. Although the adjustment method assumes that a vectorscope is not available, perform adjustment as finely as possible.
7. Light amount should be reduced by ND filters. However, if the level cannot be obtained, adjust R61 (IRIS) of the [2][4] EE & IND board.
8. If TP1 level cannot be obtained by ND filters, adjust R61 (IRIS) of the [2][4] EE & IND board.

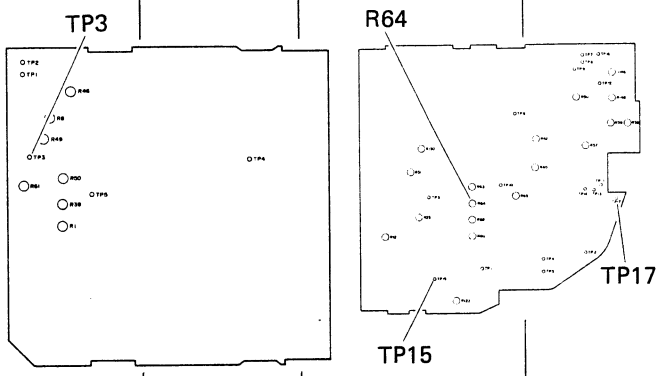
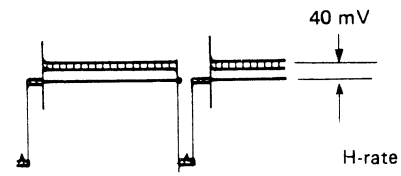
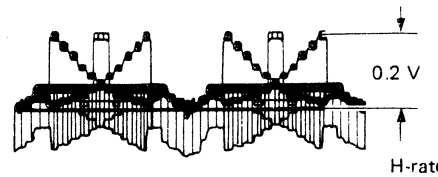
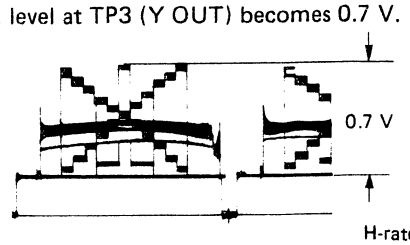
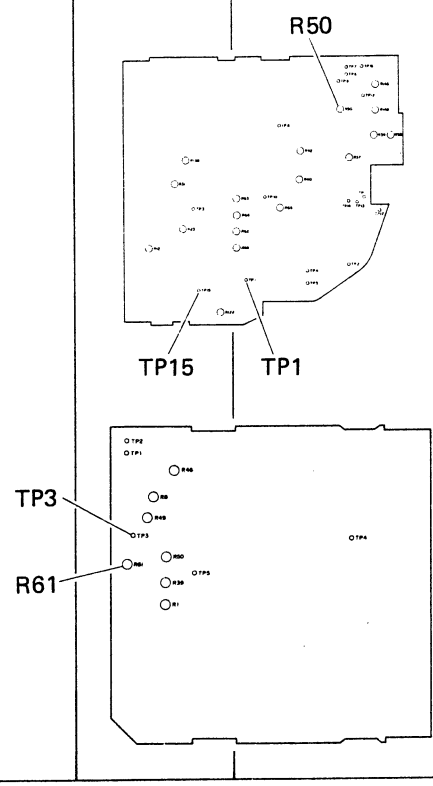
Add digit after the hyphens to indicate combined filter value.

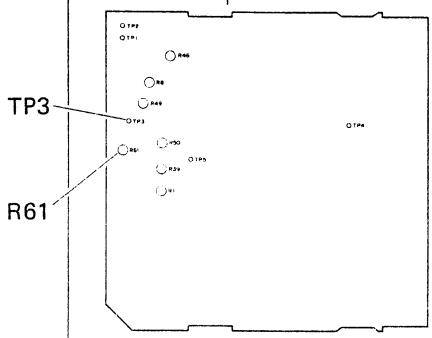
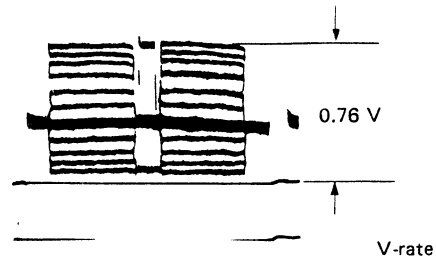
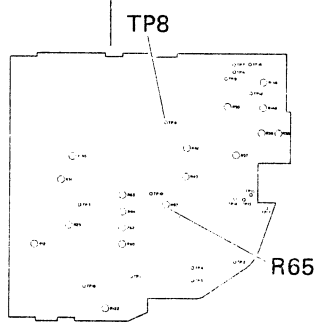
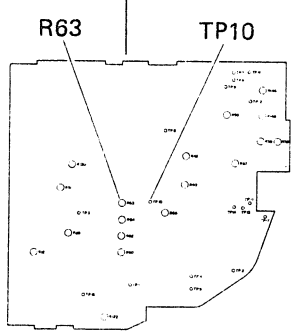
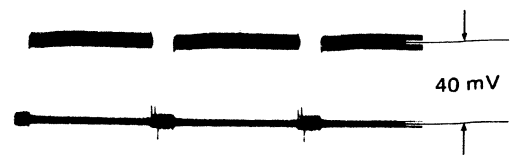
Examples:
PUJ53340A-C2 + PUJ53340A-C4 = C2 + C4 = C6
PUJ53341A-ND2 + PUJ53341A-ND8 = $2^1 + 2^3 = 2^4$ = ND16

3.7.3 Camera adjustment procedure

The following are the whole steps to adjust all VRs of the camera section in the order of adjustments. Consequently, here are some steps unnecessary for practical adjustments and repairs. Perform only the necessary items in practice.

1. 8 V Adj.
2. Y_H Setup Adj.
3. Y_H Gain Adj.
4. E-E Level Adj.
5. V. Edge Balance Adj.
6. Y_L Setup Adj.
7. Y_L Gain Adj.
8. D.E.T CLT PHASE Adj.
9. R/B Balance Adj.
10. R SET UP, B SET UP Adj.
11. R. Limiter Adj.
12. S.C. Phase Adj.
13. Color Difference Balance Adj.
14. Noise Suppressor Balance Adj.
15. Carrier Balance Adj.
16. B-Y GAIN Adj.
17. Color Sensor Adj.
18. White Balance (1) Adj.
19. White Balance (2) Adj.
20. White Balance (3) Adj.
21. Burst Phase Adj.
22. Burst Gain Adj.
23. Chroma Gain Adj.
24. White Clip Adj.
25. E-E Level Adj.
26. AGC Adj.
27. EVF Indicator Adj.
28. Back Focus Adj.

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
1	8 V Adj.	Lens closed	CN-E5 pin 3 (SW 8 V (1)) [2][4] EE & IND	R6 (8 V Adj) [2][8] REG	1) Connect the digital voltmeter between CN-E5 pin 3 and GND. 2) Adjust R6 (8 V Adj) so that level at CN-E5 pin 3 becomes 8.0 ± 0.1 V.
2	YH Setup	Lens closed AGC OFF	TP3 (Y OUT) [2][4] E-E & IND	R64 (YH SETUP)	1) Short TP15 (AGC-OFF) and TP17 (GND). 2) With the lens capped, observe H-rate waveform at TP3 (Y OUT). 3) Adjust R64 (YH SETUP) to obtain 40 mV of the SETUP level. 4) Remove the TP Short wire.   Fig. 3-7-1 **Note:** If level is insufficient even when R64 (YH SET UP) is adjusted, adjust R50 (YH SET UP) of the [2][3] VIDEO board, R8 (WHITE CLIP) of the [2][4] E-E & IND BOARD and R61 (IRIS).
3	YH GAin	Grey scale Just scan AGC OFF	TP1 (S/H OUT) [2][3] VIDEO	R50 (YH GAIN) [2][3] VIDEO	1) Short TP15 (AGC-OFF) and TP17 (GND). 2) Pick up the grey scale. 3) Adjust R61 (IRIS) so that signal level at TP1 (S/H OUT) becomes 0.2 V.  Fig. 3-7-2 **Note:** Connect a 10 kΩ (or more) resistor between TP1 (S/H OUT) and the oscilloscope. 4) In the above state, adjust R50 (YH GAIN) so that signal level at TP3 (Y OUT) becomes 0.7 V.  Fig. 3-7-3 5) Check up YH SETUP (No. 2) and YH GAIN (No. 3) adjustments again. 6) Remove the TP short wire. 

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
4	E-E Level	Grey scale Just scan	TP3 (Y OUT) [2] [4] E-E & IND	R61 (IRIS) [2] [4] E-E & IND	1) Pick up the grey scale by just scanning. (Precisely adjust the picture angle to set the grey scale's outer frame for the frame of image period.) 2) Observing waveform at TP3 (Y OUT), adjust R61 (IRIS) so that signal level of white peak becomes 0.76 V.   **Fig. 3-7-4** **Note:** If above level is not obtained by adjusting R61 (IRIS), adjust R8 (WHITE CLIP) of the [2] [4] E-E & IND BOARD.
5	V. Edge Balance	Grey scale Just scan	TP8 (V. EDGE) [2] [3] VIDEO	R65 (V. EDGE VAL) [2] [3] VIDEO	1) Pick up the grey scale. 2) Connect the oscilloscope to TP8 (V. EDGE) and observe the waveform at V-rate. 3) Adjust R65 (V. EDGE VAL) so that average level of the waveform becomes zero.  **Fig. 3-7-5** Before proceeding with color adjustments, observe the display of a color test pattern. If generally normal colors are not obtained, perform the following adjustments. Also, the adjustments below are required if hue deviates in dark locations. 1) YL Set Up (No. 6), YL Gain (No. 7), R/B Balance (No. 9), R Limiter (No. 11), B-Y Gain (No. 16), and Chroma Gain (No. 23). However, these adjustments will not yield normal color if the encoder system is not properly adjusted. Therefore, encoder system adjustments are required.
6	YL Set up	Lens closed	TP10 (YL) [2] [3] VIDEO	R63 (YL SETUP) [2] [3] VIDEO	1) Cap the lens. 2) Observing waveform at TP10 (YL), adjust R63 (YL SETUP) to obatin 40 mV of the signal waveform.   **Fig. 3-7-6**

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
7	YL Gain	Grey scale Just scan	TP4 (YL) 2 3 VIDEO	R25 (YL GAIN) 2 3 VIDEO	1) Pick up the grey scale. 2) Attach one or more ND filters (approx. ND8) so that signal level at TP3 (Y OUT) becomes 0.6 V. 3) Adjust R25 (YL GAIN) so that signal level at TP4 (YL) becomes 0.20 V.
8	DET CTL PHASE	Color bar chart	TP3 (DET OUT) 2 3 VIDEO	R12 (DET PHASE)	1) Pick up the color bar chart. 2) Adjust R12 (DET PHASE) to obtain the maximum signal level at TP3 (DET OUT).
9	R/B Balance	Color bar chart just scan	TP5 (R/B) 2 3 VIDEO	R31 (R/B BAL) 2 3 VIDEO	1) Pick up the color bar chart. 2) Connect the oscilloscope to TP5 (R/B) and adjust the oscilloscope's time axis to observe signal of the red and blue lines respectively. 3) Taking a notice of the blue line signal, adjust R31 (R/B BAL) so that levels of magenta and yellow parts of the picked up color pattern become equal. **Note:** The blue line is the scanning line of the smaller white level.

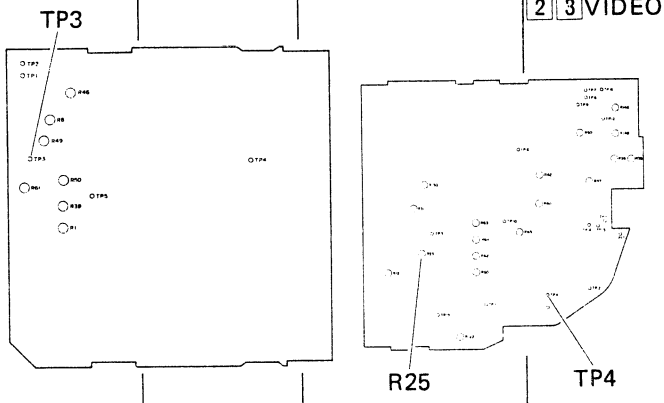
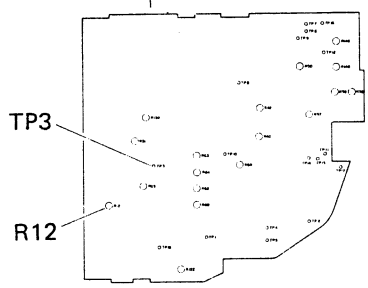


Fig. 3-7-7



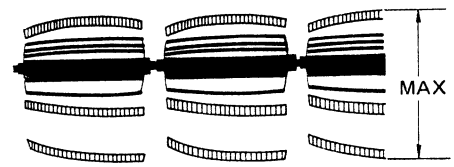
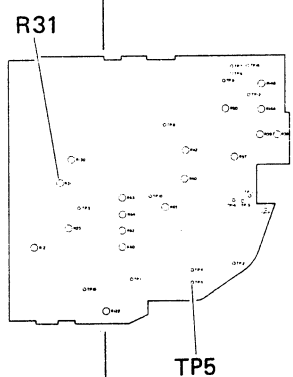


Fig. 3-7-8



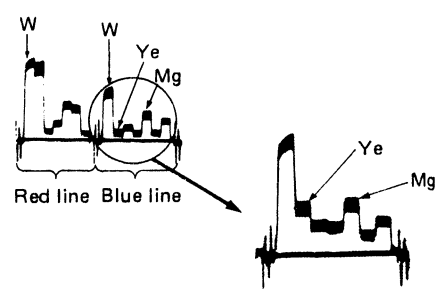
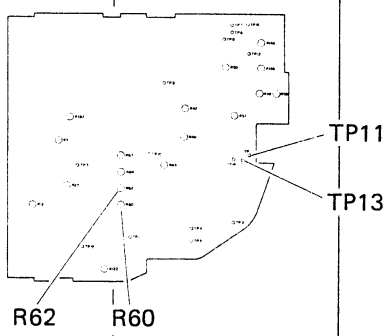


Fig. 3-7-9

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
10	R SET UP B SET UP (Coarse)	Lens closed	TP11 (B) TP13 (R) [2][3] VIDEO	R60 (R SET UP) R62 (B SET UP) [2][3] VIDEO	1) Connect oscilloscope to TP4 (C OUT) on [2][4] E-E & IND board. 2) R60 (R SET UP) adjust and R62 (B SET UP) to minimize carrier lekage.
11 (1)	R. Limiter	Color bar chart	VIDEO OUT (Vectorscope)	R130 (R LIMIT) [2][3] VIDEO	1) Pick up the color bar chart. 2) Adjust R130 (R LIMIT) to obtain the maximum signal level for red on the vectorscope.
11 (2)	R. Limiter	Color bar chart	TP13 (R) [2][3] VIDEO	R130 (R LIMIT) [2][3] VIDEO	1) Pick up the color bar chart. 2) Connect the oscilloscope to TP13 (R) and adjust R130 (R LIMIT) to obtain the maximum signal level at TP13 (R).



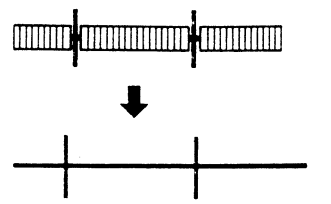
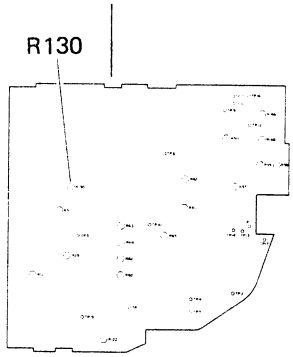


Fig. 3-7-10

When the vectorscope and the color pattern are used.



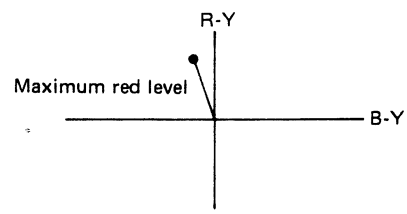


Fig. 3-7-11

When the vectorscope is not obtainable.

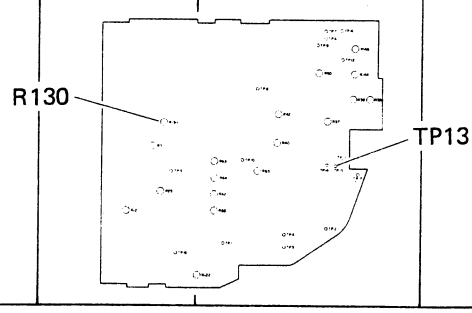
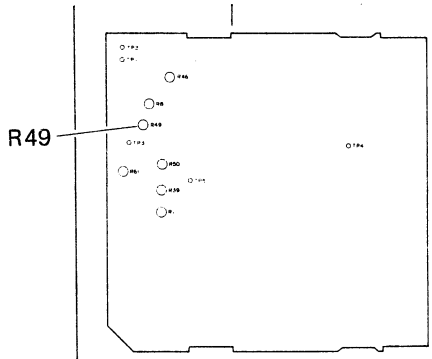
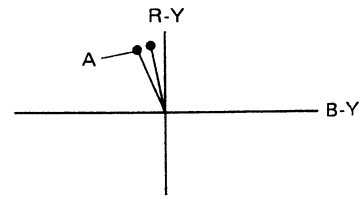
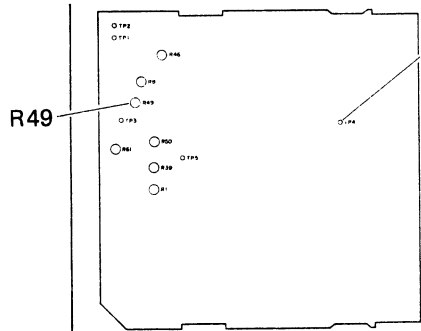
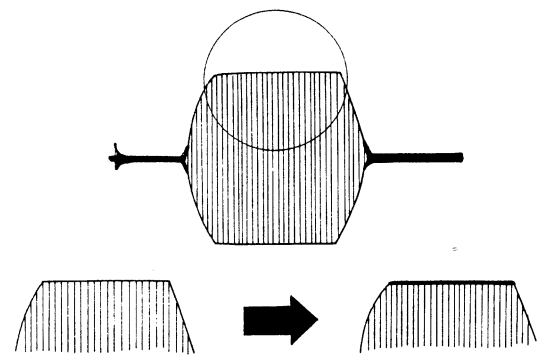
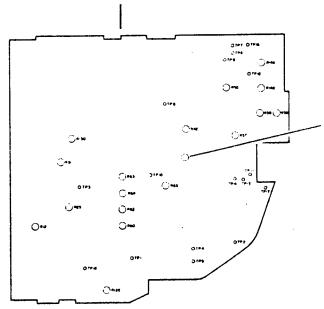
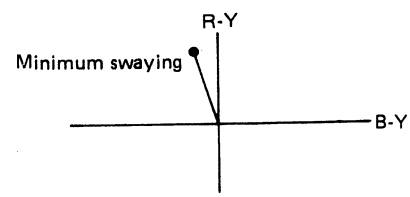
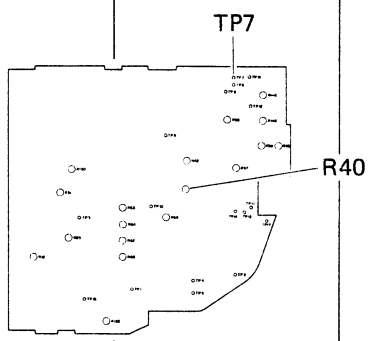
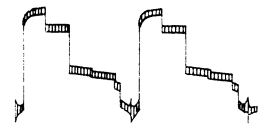
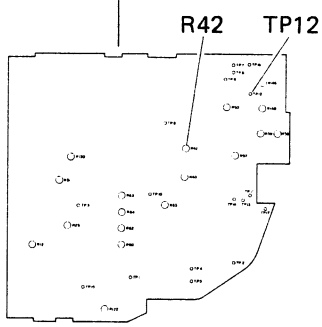
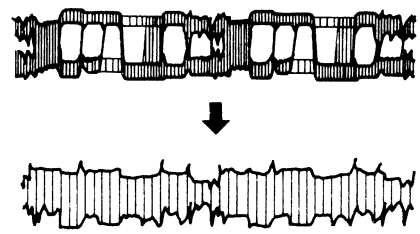
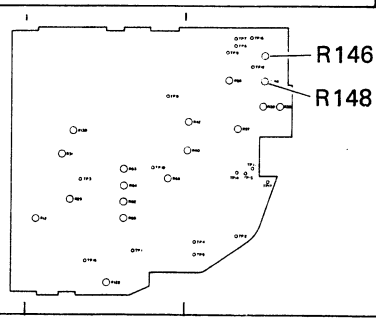
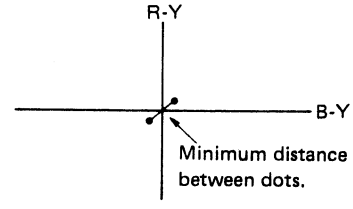
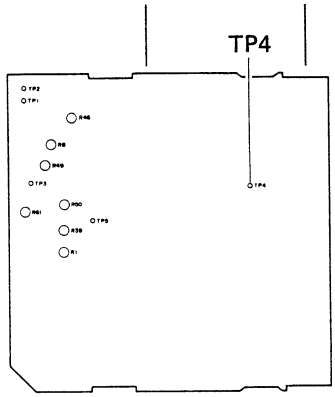
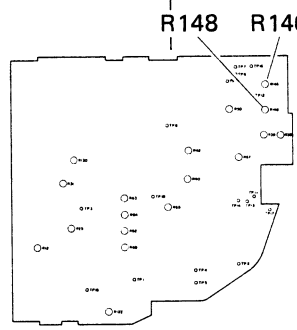
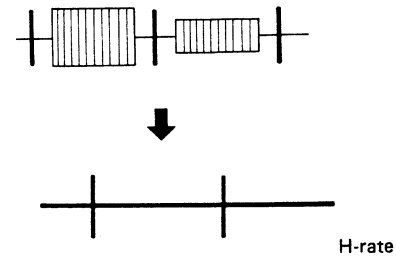
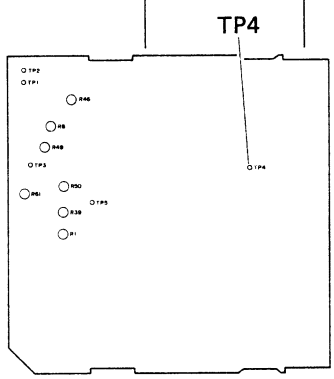
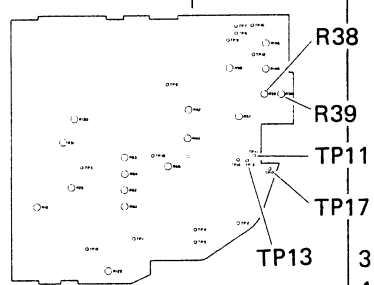
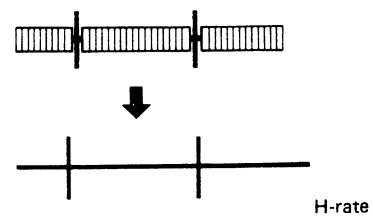
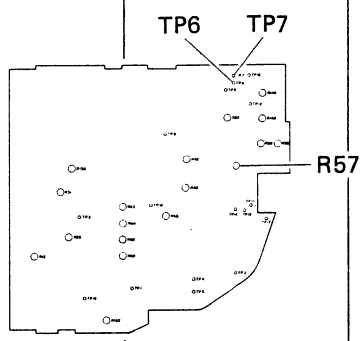
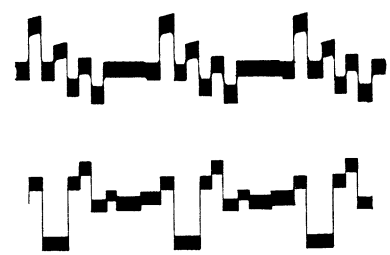


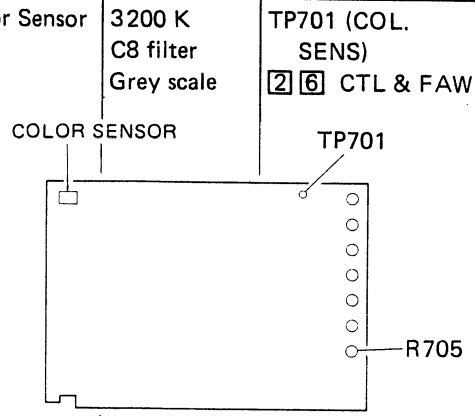
Fig. 3-7-12

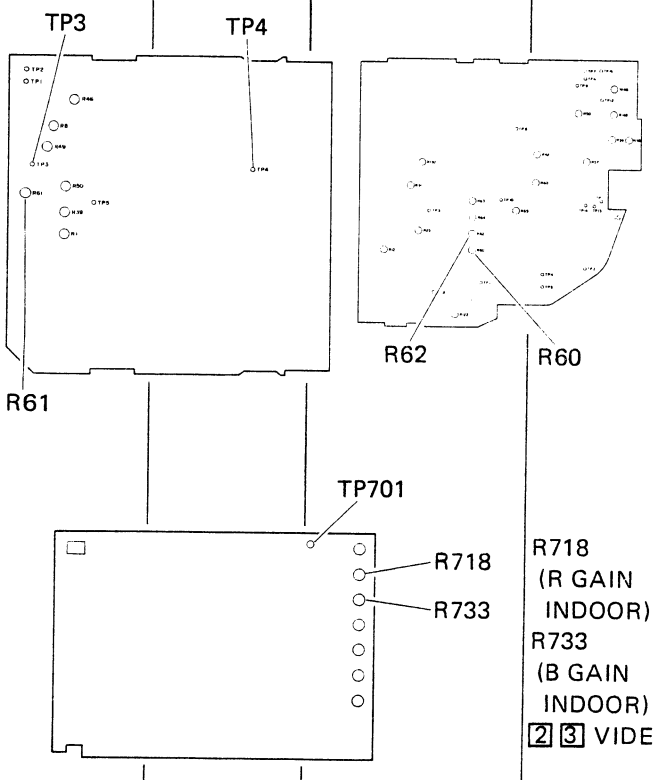
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
12 (1)	S.C. Phase	Color bar chart	VIDEO OUT (Vector scope)	R49 (S. C. PHASE) [2][4] E-E & IND	1) Pickup a colour bar chart. 2) While observing with a vectorscope, adjust R49 (SC PHASE) to overlap Red end (A).
	When the vectorscope and the color pattern are used.				
					 **Fig. 3-7-13**
12 (2)	S.C. Phase	Lens closed	TP4 (C. OUT) [2][4] E-E & IND	R49 (S.C. PHASE) [2][4] E-E & IND	1) Connect oscilloscope to TP4 (C OUT). Use the H-rate and burst sweep. 2) Adjust R49 (SC PHASE) for clearest edges.
	When the vectorscope and the color pattern are not obtainable.				
					 **Fig. 3-7-14**
13 (1)	Color Difference Balance	Color bar chart	VIDEO OUT (Vectorscope)	R40 (COL. DIFF. BAL [2][3] VIDEO	1) Pick up the color bar chart. 2) Adjust R40 so that swaying of red line becomes minimum on the vectorscope.
	When the vectorscope and the color pattern are used.				
					 **Fig. 3-7-15 (A)**

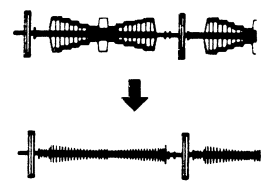
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
13 (2)	Color Difference Balance	Color bar chart	TP7 (B-Y) 2 3 VIDEO	R40 (COL. DIFF. BAL) 2 3 VIDEO	1) Observe the monitor display and adjust so that red and blue fill large portions of the picture area. 2) Connect oscilloscope to TP7 (B-Y) and observe at V-rate with center sweep. 3) Adjust R40 (COL DIF BAL) so that the waveform is the same every other horizontal line.
	When the vectorscope is not obtainable				
					 **Fig. 3-7-15 (B)**
14	Noise Suppressor Balance	Color bar chart	TP12 (COLOR NOISE) 2 3 VIDEO	R42 (NOISE SUP.) 2 3 VIDEO	1) Pick up the color bar chart. 2) Adjust R42 (NOISE SUP) so that waveform at TP12 (COLOR NOISE) is most balanced as shown in the figure.
					 **Fig. 3-7-16** **Note:** If the Color Difference Balance adjustment (9-[1], 9-[2]) has been poorly performed, satisfactory result cannot be obtained in this adjustment. (When the previous adjustment was performed in the way of 9(2), alternately repeat these two adjustments several times.
15 (1)	Carrier Balance	Lens closed	VIDEO OUT (Vectorscope)	R146 (B L.S. CARRIER BAL) R148 (R L.S. CARRIER BAL) 2 3 VIDEO	1) Adjust R146 (B. L. S. CARRIER BAL) and R148 (R L.S. CARRIER BAL) so that the distance between the dots becomes minimum on the vectorscope.
	When the vectorscope and the color pattern are used.				
					 **Fig. 3-7-17 (A)**

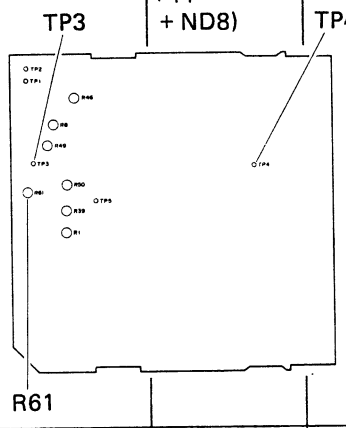
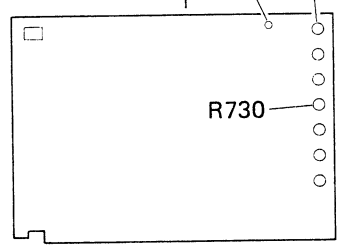
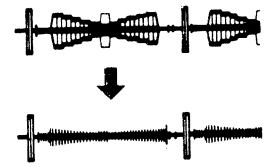
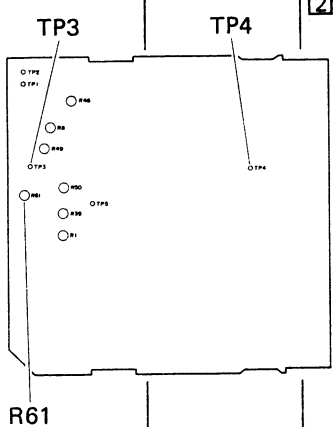
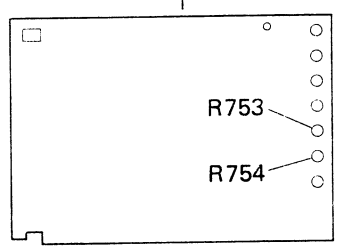
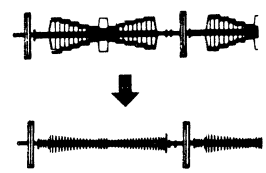
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
15 (2)	Carrier Balance	Lens closed	TP4 (C. OUT) [2] [4] E-E & IND	R146 (B L.S. CARRIER BAL) R148 (R L.S.	1) Connect the oscilloscope to TP4 (C OUT). 2) Adjust R146 (B L.S. CARRIER BAL) and R148 (R L.S. CARRIER BAL) to obtain the minimum signal level at TP4 (C OUT).
	When the vectorscope and the color pattern are not obtainable.				
					   **Fig. 3-7-17 (B)**
15 (3)	Carrier Balance	Lens closed	TP4 (CHROMA OUT) [2] [4] E-E & IND	R38 (R CARR. BAL) R39 (B CARR. BAL) [2] [3] VIDEO	1) With the lens capped, short TP11 (B), TP13 (R) and TP17 (GND). 2) Observing waveform at TP4 (CHROMA OUT), adjust R38 (R. CARR. BAL) and R39 (B. CARR. BAL) alternately to minimize the carrier leakage.
					   **Fig. 3-7-18** 3) Remove the TP short wire. 4) Repeat the adjustments of items 14 (1) to 14 (3) several times.
16	B-Y GAIN Adj.	Color bar Just scan	TP6 (B-Y) TP7 (R-Y) [2] [3] VIDEO	R57 (B-Y) [2] [3] VIDEO	1) Connect oscilloscope to TP6 (B-Y) and TP7 (R-Y). 2) Adjust R57 (B-Y) for same amplitude of two waveform use in dual trace mode.
					  **Fig. 3-7-19**

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
17	Color Sensor	3200 K C8 filter Grey scale	TP701 (COL. SENS) 2 6 CTL & FAW	R705 (COL. SENS) 2 6 CTL & FAW	1) Through a filter (C8), apply the light reflected from the grey scale to the color sensor (which should be set with the white filter cap and its bracket). Cover the color sensor's back with black vinyl tape to shut off other light and rays. The grey scale should be set on a white wall and apply rays of the halogen lamps as wide as possible. 2) Connect the digital voltmeter to TP701 and adjust R705 (COL. SENS) to obtain 1.85 ± 0.01 V. **Note:** For accurate adjustment, the background of the test pattern must be white. If not, white balance cannot be adjusted accurately. Proceed the white balance (1) and (2) adjustments in the same condition.
18	White Balance (1)	Grey scale FAW mode C8 + CC10Y → Lens C8 → Sensor	TP3 (Y OUT) TP4 (CHROMA OUT) 2 4 E-E & IND	R60 (R SETUP) R62 (B SETUP) 2 3 VIDEO	1) With C8 and CC10Y filters, pick up the grey scale in the Full Auto-White mode. At the same time, apply a cold filter to the color sensor so that voltage at TP701 becomes 1.85 ± 0.01 V, and pay attention that this voltage will be kept after that. **Note:** Be careful not to apply lights and rays other than the halogen lamps to the color sensor. 2) Short TP15 (AGC-OFF) and TP17 (GND). 3) Attach one or more ND filters so that white peak level at TP3 (Y OUT) becomes 0.3 V. (Approx. ND4 + ND8) 4) Adjust R60 (R SETUP) and R62 (B SETUP) alternately to minimize carrier leakage at TP4 (CHROMA OUT). Fig. 3-7-20 H-rate 5) Adjust R61 (IRIS) so that white peak level at TP3 (Y OUT) becomes 0.6 V. 6) Adjust R718 (R GAIN INDOOR) and R733 (B GAIN INDOOR) alternately to minimize carrier leakage at TP4 (CHROMA OUT). 7) Repeat the adjustment steps 2) through 5) several times.





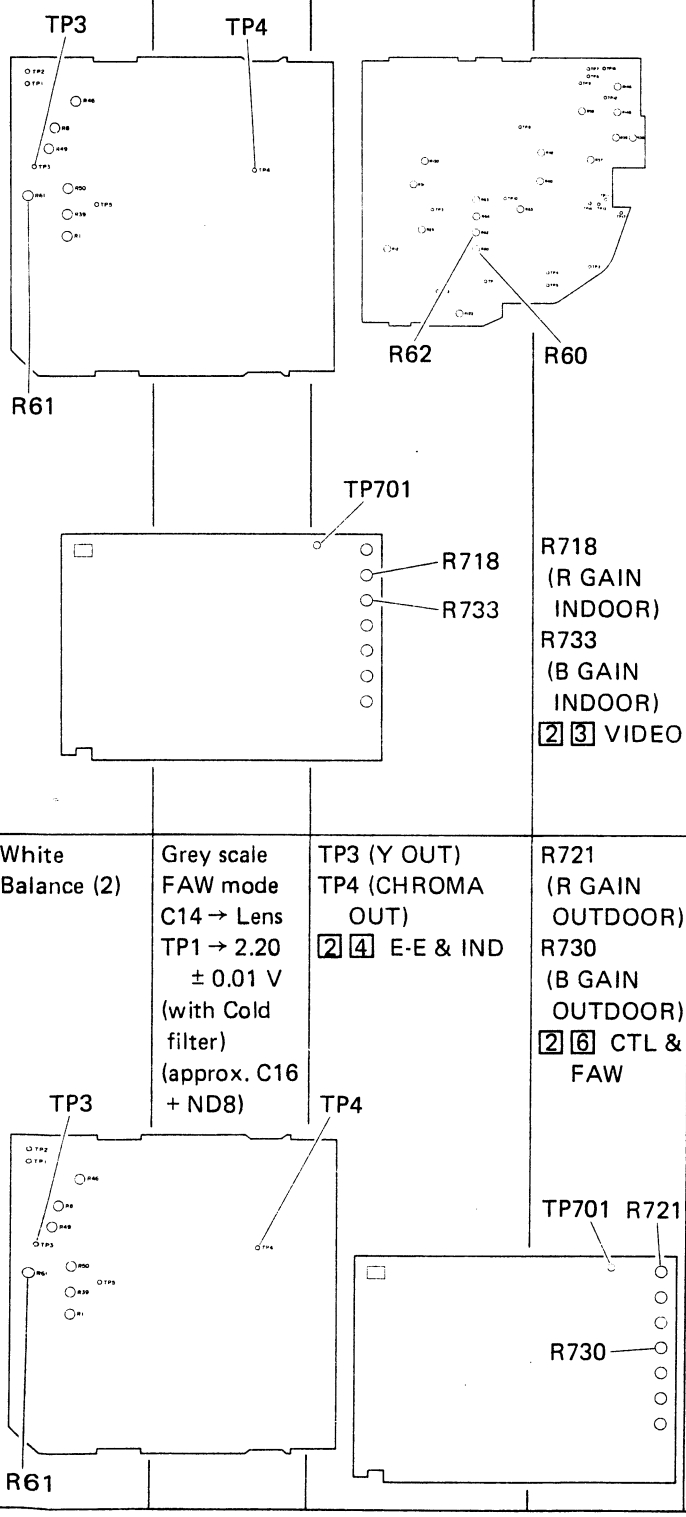


No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
19	White Balance (2)  	Grey scale FAW mode C14 → Lens TP1 → 2.20 ± 0.01 V (with Cold filter) (approx. C16 + ND8)	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] E-E & IND	R721 (R GAIN OUTDOOR) R730 (B GAIN OUTDOOR) [2] [6] CTL & FAW  	1) Attach a C14 filter to the lens, and pick up the grey scale in the Full Auto-White mode. At the same time, attach a cold filter to the color sensor (in front of the white filter cap) so that voltage at TP701 becomes 2.20 ± 0.01 V, and pay attention that this voltage will be kept after that. **Note:** Be careful not to expose the color sensor to other ray and light. 2) Adjust R721 (R GAIN OUTDOOR) and R730 (B GAIN OUTDOOR) alternately to minimize carrier leakage at TP4 (CHROMA OUT).  **Fig. 3-7-21** H-rate 3) Repeat the white balance (1) and (2) adjustments several times.
20	White Balance (3)  	Grey scale Indoor mode C14 filter	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] E-E & IND	R754 (INDOOR PRESET) [2] [6] CTL & FAW  R753 (OUTDOOR PRESET) [2] [6] CTL & FAW	1) Without any filter attached, pick up the grey scale in the INDOOR mode. 2) Adjust R61 (IRIS) to obtain 0.6 V of white peak level at TP3 (Y OUT). 3) Adjust R754 (INDOOR PRESET) to minimize carrier leakage at TP4 (CHROMA OUT).  **Fig. 3-7-22** H-rate 4) Set the camera for the OUTDOOR mode and pick up the grey scale with a C14 filter attached to the lens. 5) Adjust R753 (OUTDOOR PRESET) to minimize carrier leakage at TP4 (CHROMA OUT).

Approximate adjustment

In situations where requirements are not severe, the following simplified adjustment procedure can be performed.

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
A	White Balance (1)	Grey scale FAW mode C8 + CC10Y → Lens C8 → Sensor	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] E-E & IND	R60 (R SETUP) R62 (B SETUP) [2] [3] VIDEO	1) In the full atuo white mode, pick-up a greyscale through a C8 filter. Connect a digital voltmeter to TP1 (COL SENS) and adjust R705 for 1.85 ± 0.01 V. **Note:** Be careful not to apply lights and rays other than the halogen lamps to the color sensor. 2) Short TP15 (AGC-OFF) and TP17 (GND). 3) Attach one or more ND filters so that white peak level at TP3 (Y OUT) becomes 0.3 V. (Approx. ND4 + ND8) 4) Adjust R60 (R SETUP) and R62 (B SETUP) alternately to minimize carrier leakage at TP4 (CHROMA OUT).
				R718 (R GAIN INDOOR) R733 (B GAIN INDOOR) [2] [3] VIDEO	5) Adjust R61 (IRIS) so that white peak level at TP3 (Y OUT) becomes 0.6 V. 6) Adjust R718 (R GAIN INDOOR) and R733 (B GAIN INDOOR) alternately to minimize carrier leakage at TP4 (CHROMA OUT). 7) Repeat the adjustment steps 2) through 5) several times.
B	White Balance (2)	Grey scale FAW mode C14 → Lens TP1 → 2.20 ± 0.01 V (with Cold filter) (approx. C16 + ND8)	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] E-E & IND	R721 (R GAIN OUTDOOR) R730 (B GAIN OUTDOOR) [2] [6] CTL & FAW	1) In the full auto white mode, install a C14 filter and pick-up a greyscale. Connect a digital voltmeter to TP1 (COL SENS) and adjust R705 for 2.20 ± 0.01 V. **Note:** Be careful not to expose the color sensor to other ray and light. 2) Adjust R721 (R GAIN OUTDOOR) and R730 (B GAIN OUTDOOR) alternately to minimize carrier leakage at TP4 (CHROMA OUT).



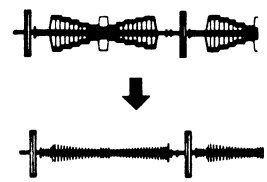


Fig. 3-7-23 H-rate

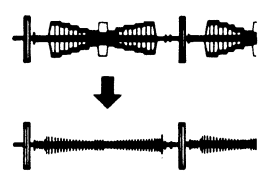
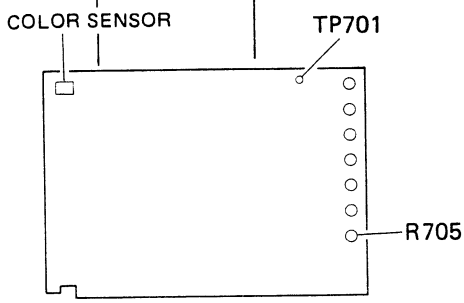
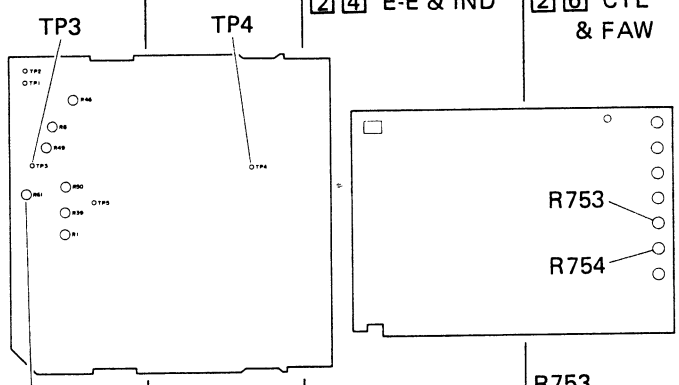


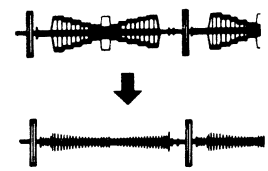
Fig. 3-7-24 H-rate

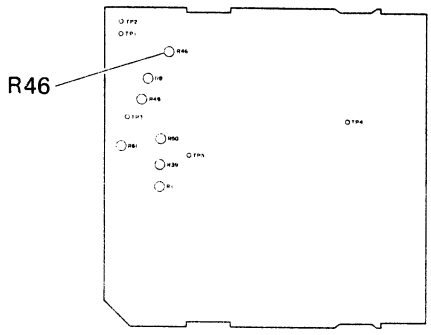
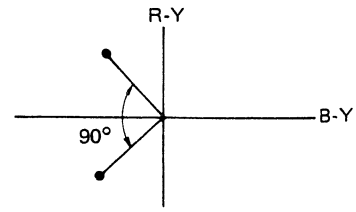
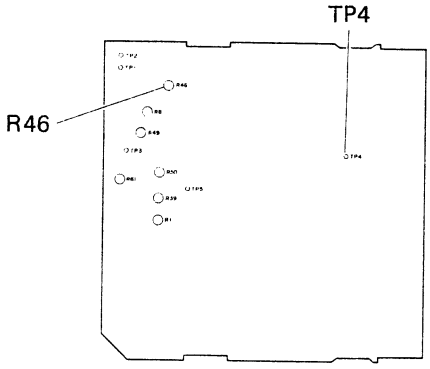
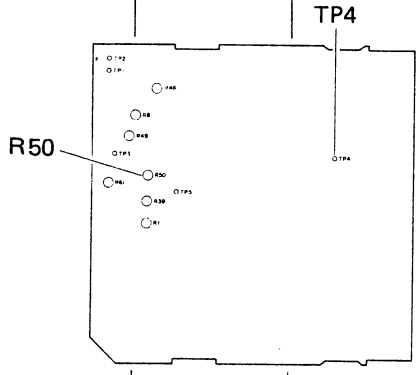
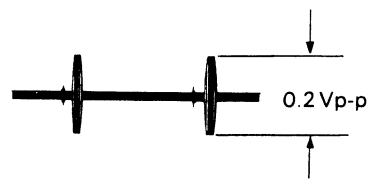
3) Repeat the white balance (1) and (2) adjustments several times.

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
C	Color Sensor	3200 K C8 filter Grey scale	TP701 (COL. SENS) 2 6 CTL & FAW	R705 (COL. SENS) 2 6 CTL & FAW	1) Through a filter (C8), apply the light reflected from the grey scale to the color sensor (which should be set with the white filter cap and its bracket). Cover the color sensor's back with black vinyl tape to shut off other light and rays. The grey scale should be set on a white wall and apply rays of the halogen lamps as wide as possible. 2) Connect the digital voltmeter to TP701 and adjust R705 (COL. SENS) to obtain 1.85 ± 0.01 V. **Note:** For accurate adjustment, the background of the test pattern must be white. If not, white balance cannot be adjusted accurately. Proceed the white balance (1) and (2) adjustments in the same condition.
D	White Balance (3)	Grey scale Indoor mode C14 filter	TP3 (Y OUT) TP4 (CHROMA OUT) 2 4 E-E & IND	R754 (INDOOR PRESET) 2 6 CTL & FAW R753 (OUTDOOR PRESET) 2 6 CTL & FAW	1) Without any filter attached, pick up the grey scale in the INDOOR mode. 2) Adjust R61 (IRIS) to obtain 0.6 V of white peak level at TP3 (Y OUT). 3) Adjust R754 (INDOOR PRESET) to minimize carrier leakage at TP4 (CHROMA OUT). Fig. 3-7-25 4) Set the camera for the OUTDOOR mode and pick up the grey scale with a C14 filter attached to the lens. 5) Adjust R753 (OUTDOOR PRESET) to minimize carrier leakage at TP4 (CHROMA OUT).



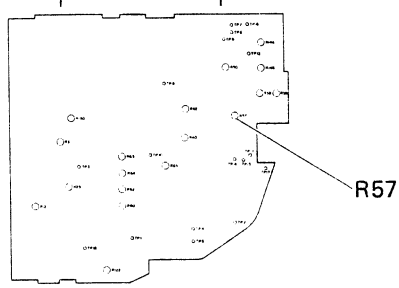


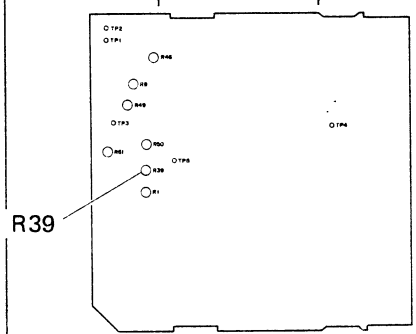


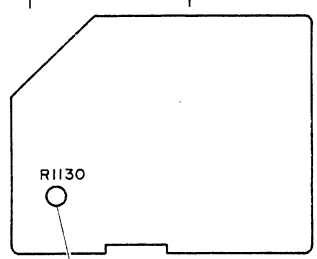
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
21 (1)	Burst Phase	Color bar chart	VIDEO OUT (Vectorscope)	R46 (B PHASE) [2][4] E-E & IND	1) Adjust R46 (B PHASE) so that burst phase angle becomes 90° as shown in the figure below.
	When the vectorscope and the color pattern are used.				
					 Fig. 3-7-26
21 (2)	Burst Phase	Lens closed	TP4 (C OUT) [2][4] E-E & IND	R46 (B. PHASE) [2][4] E-E & IND	1) Connect oscilloscope to TP4 (C OUT) and observe the burst signal. 2) Adjust R46 (B PHASE) for minimum burst signal.
	When the vectorscope and the color pattern are not obtainable.				
					
22	Burst Gain	Lens closed	TP4 (CHROMA OUT) [2][4] E-E & IND	R50 (BURST GAIN) [2][4] E-E & IND	1) Adjust R50 (BURST GAIN) so that color burst signal level at TP4 (CHROMA OUT) becomes 0.2 Vp-p.
					 Fig. 3-7-27

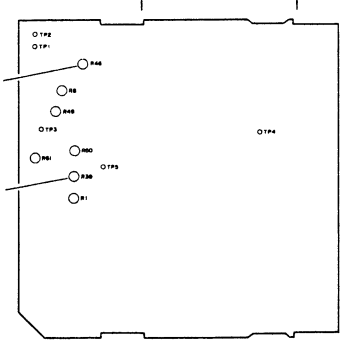
No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
23 (1)	Chroma Gain B-Y Gain Yellow Sup	Color bar chart	VIDEO OUT (Vectorscope)	R39 (CHROMA GAIN) [2][4] EE & IND R57 (B-Y) [2][3] VIDEO R1130 (Yellow sup) [2][9] SUB CAR	1) Pickup a colour bar chart. 2) Set for 100% burst level. 3) Adjust R39 (CHROMA GAIN) so that Red level is slightly less than 100%. 4) Turn R1130 (YELLOW SUP) fully clockwise. 5) Adjust R57 (B-Y) for 100% magenta level. 6) Adjust R1130 (YELLOW SUP) so that yellow appears at edge of vectorscope. 7) Repeat above adjustments 4 through 6 several times.
23 (2)	Chroma Gain	Object whose color phase is easily distinguishable	Monitor-TV	R39 (CHROMA GAIN) [2][4] E-E & IND R57 (B-Y GAIN) [2][3] VIDEO R1130 (Yellow sup) [2][9] PAL SUB	**Note:** For proceeding this adjustment, color phase and density of a monitor-TV to use, R9 (E-E Y LEVEL) and R11 (E-E C LEVEL) of the Y/C board of the deck section have been accurately adjusted. 1) Picking up a colored object and observing a monitor-TV, adjust R39 (CHROMA GAIN) to obtain appropriate chroma amount. 2) Picking up an object whose color phase is distinguishable and observing a monitor-TV, perform fine adjustments of R1130 (Yellow sup) and R57 (B-Y GAIN) to obtain the most natural colors of red, green, blue and skin tone. **Note:** Be sure to perform just fine adjustments. Before proceeding this adjustment, confirm that the color sensor adjustment (No. 17) and white Balance (1), (2), (3) adjustment, (No. 18, 19, 20) have been completed.

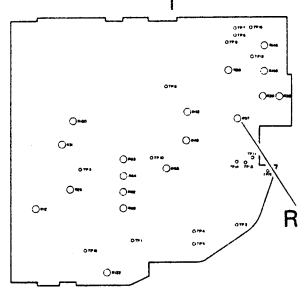
When the vectorscope and the color pattern are not obtainable.



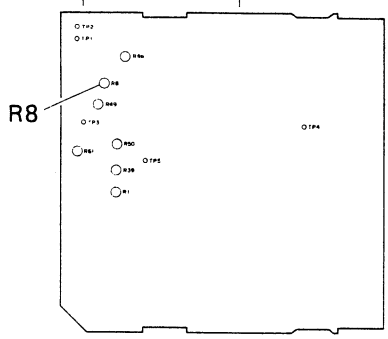








No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
24	White Clip Adj.	Grey scale Just scan	TP3 (Y OUT) [2][4] E-E & IND	R8 (WHITE CLIP) [2][4] E-E & IND	1) Pick up the grey scale and adjust R61 (IRIS) to open the iris in order to choke signals. 2) Adjust R8 (WHITE CLIP) so that white peak level at TP3 (Y OUT) becomes 0.78 V.
25	E-E Level	Grey scale Just scan	TP3 (Y OUT) [2][4] E-E & IND	R61 (IRIS) [2][4] E-E & IND	1) Pick up the grey scale by just scanning. (Precisely adjust the picture angle to set the grey scale's outer frame for the frame of image period.) 2) Observing waveform at TP3 (Y OUT), adjust R61 (IRIS) so that signal level of white peak becomes 0.76 V. **Note:** Before proceeding this adjustment, confirm that the YH SETUP adjustment (No. 2) and YH GAIN adjustment (No. 3) have been completed.
26	AGC	Iris closed	TP15 (AGC OFF) [2][3] VIDEO	R122 (AGC) [2][3] VIDEO	1) Connect the digital voltmeter between TP15 (AGC OFF) and TP17 (GND). 2) Adjust R122 (AGC) so that level at TP15 (AGC OFF) becomes 2.0 V ± 0.05 V.



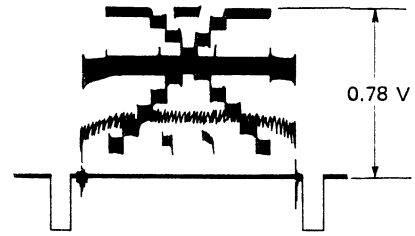
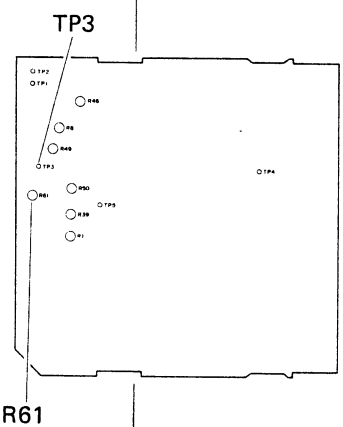


Fig. 3-7-28 (a)



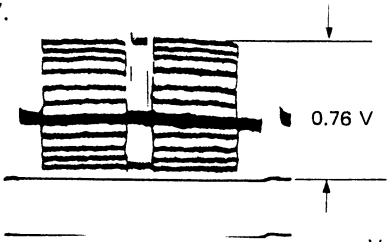
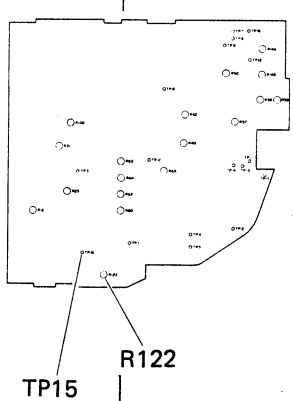
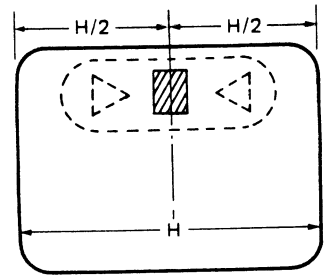
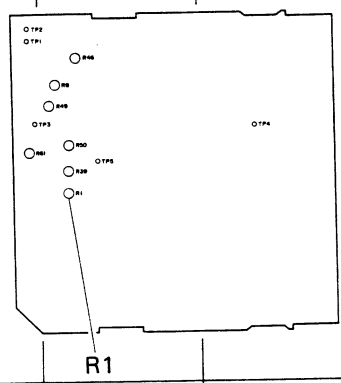
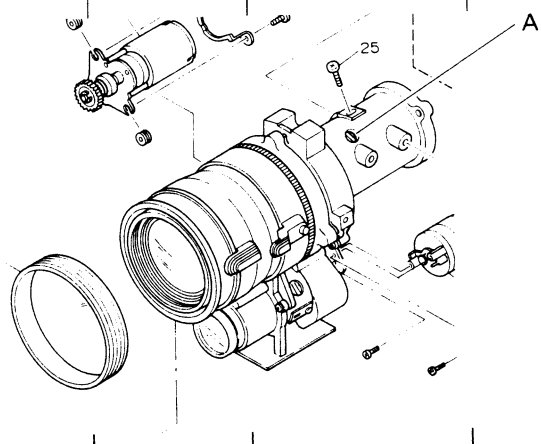


Fig. 3-7-28 (b)



No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
27	Indicator Adj.	Lens closed	Electronic Viewfinder	R1 (IND OSC) 2 4 E-E & IND	1) Adjust R1 (IND OSC) so that the indicator inside the electronic viewfinder is positioned at the center.  Fig. 3-7-29
28	Back Focus Adj.	Object far apart 100 m or more Isis opened (w/ND filter)	VIDEO OUT (Monitor picture)	Master Lens	1) Shoot an object as much as 100 m (or far ahead) with the lens set to the wide-angle position (9 mm). 2) Attach an ND filter to the lens and open the iris. (Confirm that "LIGHT" indication appears on the electronic viewfinder's screen. 3) Set the focus ring to the infinity (∞). 4) Loosen the screw (25), and adjust the position of the master lens (A) with the back focus adjustment driver, and then, bring the object into focus viewing the monitor's picture. 5) After the above adjustment, tighten the screw (25) and check up the focus again.

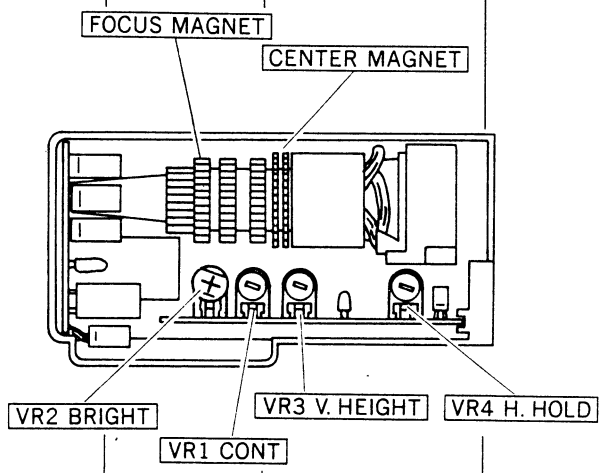




3.7.4 Electronic viewfinder (EVF) adjustment

Caution: High voltage appears at the CRT anode, HV module, etc.

No.	Item	Mode	Check Point	Adjustment Parts	Adjustment & Checkup
1	Horizontal Sync.	Grey scale or Monoscope	EVF (CRT)	VR4 (H. HOLD) 3 0 VF (1)	1) Observing the viewfinder, turn VR4 fully clockwise to make unstable pictures. 2) Gradually turn VR4 counterclockwise until the picture becomes stable. When the picture is completely stabilized, mark the VR position with a felt pen or the like for further reference. 3) Next, turn VR4 fully counterclockwise to make the picture unstable again. 4) Turn VR4 gradually clockwise until the picture is stabilized. Mark the VR position in the same manner as in 2) above. 5) Set VR4 at the midpoint between the two markings.
2	Vertical Scanning	Grey scale or Monoscope	EVF (CRT)	VR3 (V. HEIGHT) 3 0 VF (1)	1) Observing the viewfinder, adjust VR3 for normal picture amplitude.
3	Centering	Grey scale	EVF (CRT)	Centering magnet	1) Pick up the grey scale to locate it at the center of TV picture, adjust the centering magnet so that image of the grey scale is positioned at the center of the viewfinder screen.
4	Focus	Grey scale	EVF (CRT)	Focus magnet	1) Observing the viewfinder, adjust the focus magnet of the deflection yoke to obtain a clear picture of the central part of the grey scale image.
5	Brightness	Iris closed (Lens capped)	EVF (CRT)	VR2 (BRIGHT) 3 0 VF (1)	1) With the iris closed, adjust VR2 so that the CRT raster of the viewfinder is just barely visible.
6	Contrast	Grey scale	EVF (CRT)	VR1 (CONT) 3 0 VF (1)	1) Observing the viewfinder, adjust VR1 to obtain the best gradation of the grey scale image.



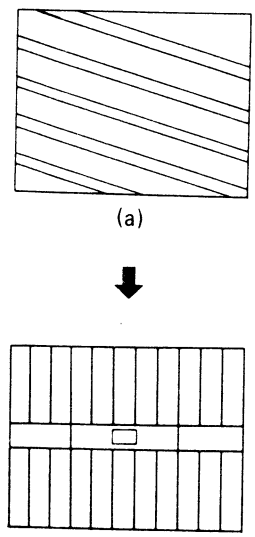


Fig. 3-7-30

3.8 REPLACEMENT AND ADJUSTMENTS OF AUTO FOCUS (AF) BOARD

3.8.1 AF board unit

The AF board unit is mainly consists of the pre-aligned TCL sensor and the AF lens assembly whose electrical adjustments are completely performed at the factory. (See Fig. 3-8-1.)
Therefore, main electrical adjustment of the AF board unit is alignment of the TCL sensor.

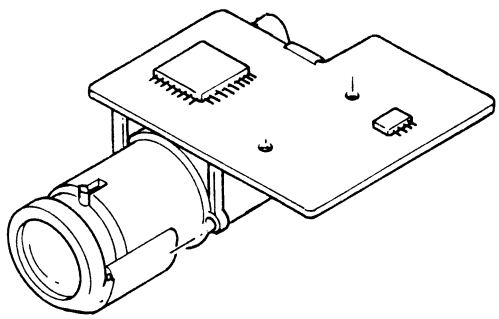


Fig. 3-8-1

3.8.2 AF board unit replacement

1. Remove two screws (A) and three screws (B) securing the AF board unit, and pull out the AF board unit in the direction of the arrow.
2. Replace the AF board unit with a new one and fix it with the screws in the reverse order of its removal.

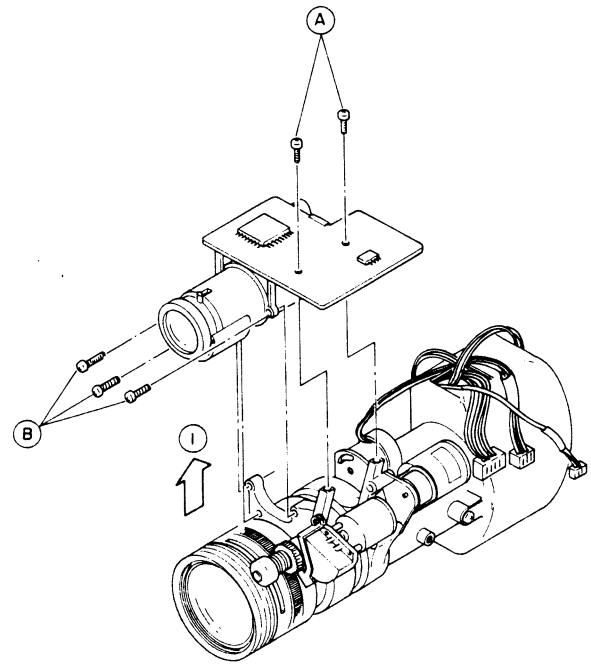


Fig. 3-8-2

3.8.3 Adjustment parts location

Shooting the test pattern with the iris opened, adjust light intensity so that the "LIGHT" of the indicator display on the electronic viewfinder is flickering.

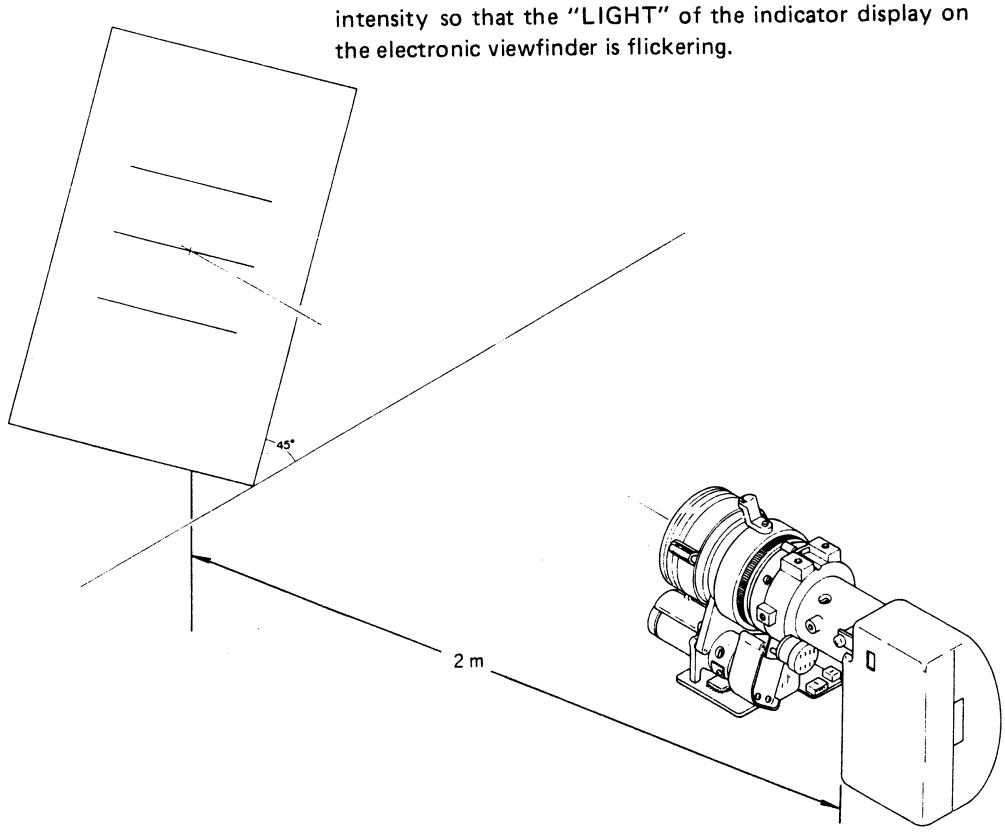


Fig. 3-8-3

3.8.4 AF adjustment chart

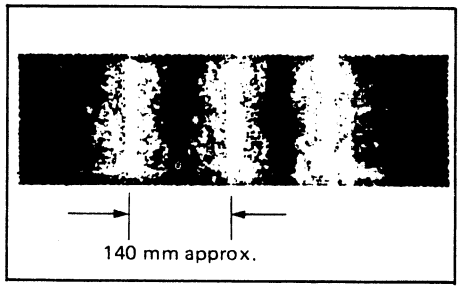


Fig. 3-8-4

3.8.5 AF adjustment

Note: Confirm that back focus of the image pickup system is properly adjusted.

1. Set up the AF adjustment chart and lighting equipment as shown in Fig. 3-8-3.
2. Set the zoom ring to the telephoto position, and settle the lens to shoot the chart at the center of the picture. In the manual focusing mode, turn the focus ring to bring the chart in the best focus.

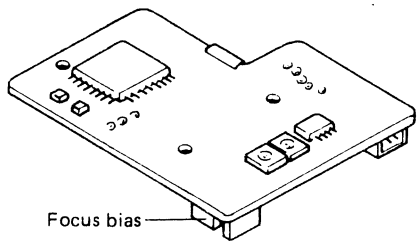


Fig. 3-8-5

3. Insert the AF Back Focus driver for AF adjustment into the AF lens adjustment hole, and loosen the lock screw.

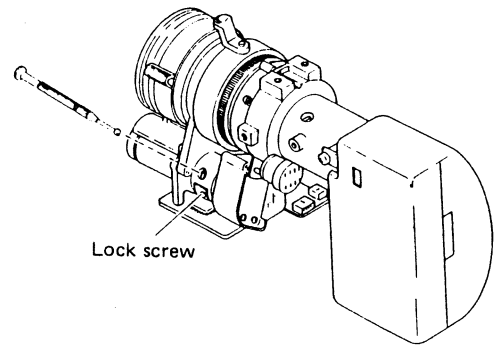


Fig. 3-8-6

4. Observing the AF indication inside the electronic viewfinder, adjust the AF lens position with the AF Back Focus driver and tighten the lens with the lock screw.

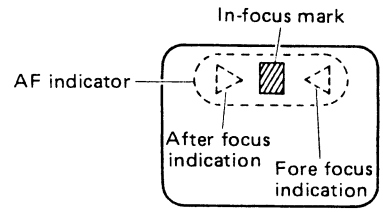


Fig. 3-8-7

5. Repeat the same sequence of section 2.3. However, separate the AF unit and AF adjustment chart by 4 meters.
6. While observing the viewfirder display, use tweezers to torn the focus bias VR to where focus indication. Set to the position midway between where the focus indication extinguishes during clockwise rotation and during counter-clockwise rotation of the VR.
7. Check up every item of Table 3-8-1 for satisfactory AF performance.

Item	Check points	Remedy
Auto Focus	In the setting condition shown in Fig. 3-8-3 with the zoom lens set at the telephoto position, there is little difference between the in-focus position in AF mode and the best focus position in manual mode.	Check up the focus and AF focus adjustments again.
Focusing Time	The focus lens drives within 3 seconds from 1 m to the infinity (∞) (20°C).	Check up connection between the AF board unit and the AF motor. Pay attention to interference between the AF lens frame and the AF motor output gear.
AF Control Times	In the setting condition of Fig. 3-8-3 with the zoom lens set at the telephoto position, the lens becomes in-focus within three times of driving starting with its focus ring set at the infinity (∞) or 1 m.	Perform the focus bias adjustment again.
Low Contrast	When the AF lens is directed toward a plain monochromatic chart, any AF indication is not displayed and remarkable focusing operation cannot be seen. (AF indication appears once or nil at 20°C for five seconds.)	Check for uneven lighting and chart soiling.
AF Area	In the setting condition of Fig. 3-8-3, there is an AF detection area at the center of the picture.	Check up setting of the board unit and shortcircuit.

Table 3-8-1

SECTION 4
DIAGRAMS AND CIRCUIT BOARDS

4.1 SCHEMATIC DIAGRAM NOTES

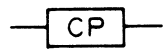
1. parts are safety related parts. When replacing them, be sure to use the specified parts.
2. Voltage and waveform measurements.
   Voltage: Measured with a digital voltmeter in DC range.
   Waveform: When the grey scale pattern which is lighted up brightly is shot in the Full-Auto mode, waveforms become as follow;
3. Unit indications

No units:[Ω]	No units:[μF]	μ/μH:[μH]
K:[kΩ]	P:[pF]	m:[mH]
M:[MΩ]		

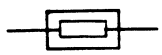
Thermistor

Thermal Fuse

Circuit Protector

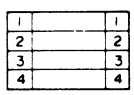


Posistor

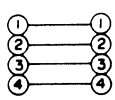


Connector

Connector soldered to board
(solder)



Connector
(Boards connected directly to each other)

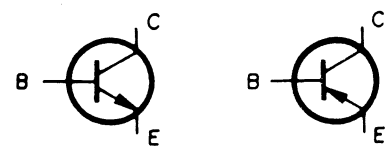


Joined by soldering

COUNT UP : Active only at high.
COUNT DOWN : Active only at low.

⬭ : Connected pattern in the board.

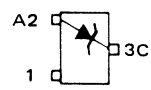
4. Chip transistor



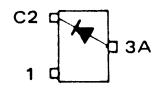
(Standard type)

5. Chip diode

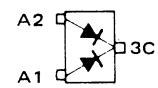
RD5.6M-T1B
RD5.6M-T2B
RD7.5M-T1B2
RD7.5M-T1B3
MA3075M
MA3075H
RD3.9M-T1B
MA704



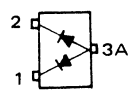
MA151A



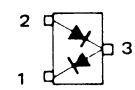
DAN202K
MA151WK



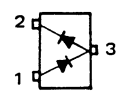
DAP202K
MA151WA



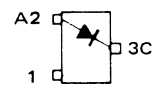
MA153

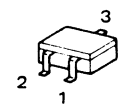


DA204K

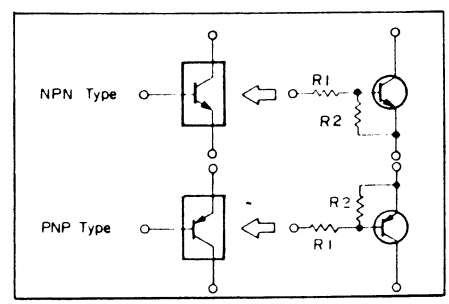


MA151K





6. Digital transistor



RESISTOR VALUES

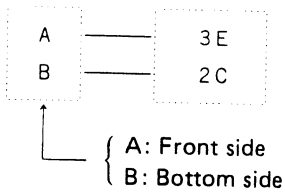
JUNCTION	Part No.	R1 (kΩ)	R2 (kΩ)
PNP	DTA124EK	22	22
	DTA144EK	47	47
	UN2112	22	22
NPN	FA1F4M	47	47
	DTC144EK	47	47
	DTC114YK	10	47

Note: The digital transistor includes built in resistors.
It features small size and high reliability.
Both PNP and NPN types are available.
USES: INVERTER, INTERFACE, DRIVER CIRCUITS.

4.2 REPLACING SUBMINIATURE "CHIP" PARTS

1. Some resistors, shorting jumpers (0 Ω resistance), ceramic capacitors, transistors, and diodes are chip parts. These chip parts cannot be reused after they are once removed.
2. Additional compactness is achieved by using subminiature chip parts for certain circuit elements. When replacing these parts, note the cautions outlined below.

   Chip transistors and diodes used in this model are outlined as follows.
3. Chip part addresses
   In the circuit diagrams, blue lettering refers to chip part mounting position addresses.



4. Required tools:
   1) Fine tipped, well insulated soldering "pencil", about 30 Watts.
   2) Tweezers
   3) Blower type hair dryer.
5. Soldering cautions:
   1) Do not apply heat for more than 3 seconds.
   2) Avoid using a rubbing stroke when soldering.
   3) Discard removed chips; do not reuse them.
   4) Supplementary cementing is not required.
   5) Use care not to scratch or otherwise damage the chips.
6. Removal (resistors, capacitors, etc.):
   1) Melt the solder at one side.

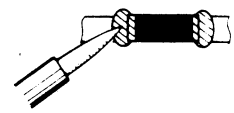
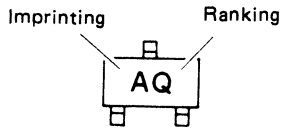
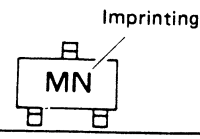


Fig. 4-1

- **Chip transistor and chip diode imprinting**

Transistors				Diodes	
Type	Imprinting	Type	Imprinting	Type	Imprinting
DTA124EK	15	2SC1009A	(FA3,FA4)	DA204K	ORANGE
DTA144EK	16	2SC1623	L(4-7)	DAN202K	GRAY
DTC114YK	64	2SC1623L5	L5		GREEN
DTC144EK	26	2SC1623L6	L6	DAP202K	
DTC144WK	86	2SC2412K	B(Q-S)	DSA010	W1
UN2112	6B	2SC2412KT-96R	BR	MA151A	MA
FA1F4M	M6	2SC2412KT-97R	BR	MA151K	MH
FMS2	S2	2SC2413KT-96PQ	A(PQ)	MA151WA	MN
FMW2	W2	2SC2413KT-97PQ	A(PQ)	MA151WK	MT
2SA812M5	M5	2SC2712GL	L(GL)	MA152A	MB
2SA812M6	M6	2SC2778C	KC	MA153	MC
2SA1022C	EC	2SC2778BC	K(BC)	MA704	MIK
2SA1036KT-96R	HR	2SC3395	BY	MA3075H	7.5H
2SA1037K	F(Q-S)	2SC3735-T1BB33	B33	MA3075M	7.5M
2SA1037KT-96R	FR	2SC3735-T1BB34	B34	RD3.9M-T1B	391
2SA1365-TIG	AG	2SD601	Y(O-T)	RD5.6M-T1B	561
2SA1365-T2G	AG	2SD601Q	YQ	RD5.6M-T2B	561
2SA1462-T2BY33	Y33	2SD601R	YR	RD7.5M-T1B2	7.52
2SA1464-T1BY12	Y12	2SD813R	QR	RD7.5M-T1B3	7.53
2SB624-T1BBV5	(BV1-BV5)	2SK198	10(P-R)		
2SB624-T2BBV5	(BV1-BV5)	2SK198PQ	10(PQ)		
2SB709	A(O-T)	2SK621	30		
2SB709R	AR				
2SB709QR	A(QR)				
2SB710S	CS				





Note ; ( ) refers to Transistor rank.

2) Grasp the part with tweezers and melt the solder at the other side.

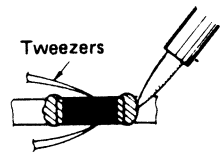


Fig. 4-2

3) Remove the part with a twisting motion.

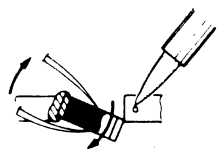


Fig. 4-3

7. Removal (transistors, diodes, etc.):
1) Melt the solder of one lead.

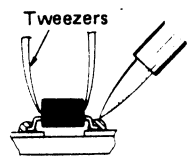


Fig. 4-4

2) Lift the side of that lead upward.

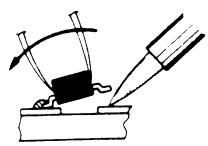


Fig. 4-5

3) Simultaneously heat solder of the two remaining leads and lift part to remove.

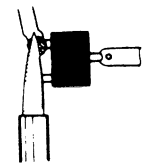


Fig. 4-6

8. Preheating (except for semiconductors):
Immediately before installing new resistors or capacitors, use a blower type hair dryer and preheat the part for about two minutes at approximately 150°C.

9. Replacement:
1) Presolder the contact points of the circuit pattern.

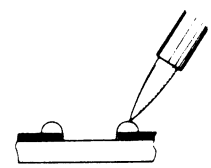


Fig. 4-7

2) Press the part downward with tweezers and apply the soldering pencil as indicated in the figure.

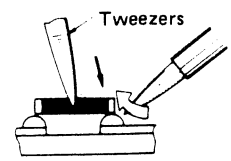


Fig. 4-8

4.3 POWER SUPPLY

Designation	Description
AL 9.6 V	Power supplied directly from battery or via DC jack.
AL 5 V	Obtained from AL 9.6 V through regulator IC1 of the [0][1] MAIN board.
SW 9.6 V	Obtained from AL 9.6 V which is controlled by the POWER switch and supplied via relay RY-1 of the [0][1] MAIN board.
SW 5 V (1)	Obtained from SW 9.6 V through regulator DC-DC convertor of the [0][1] MAIN board.
MOTOR 9.6 V	SW 9.6 V supplied to drum and capstan motors.
LOAD 9.6 V	SW 9.6 V supplied to mode control motor.
CA 9.6 V	Supplied the SW 9.6 V to camera.
EE 20 V	This is produced from CA 9.6 V by DC-DC convertor.
EE 15 V	This is produced from CA 9.6 V by DC-DC convertor.
EE 8 V	This is produced from CA 9.6 V by DC-DC convertor.
EE 9 V	This is produced from CA 9.6 V by DC-DC convertor.
SW 8 V (2)	CA 9.6 V rectified to 8 V by [2][4] EE & IND IC6.
SW 8 V (1)	CA 9.6 V rectified to 8 V by [2][8] REGULATOR Q1 and IC1.
SW 5 V (2)	CA 9.6 V rectified to 5 V by [2][8] REGULATOR DC-DC converter.

4.4 KEY TO ABBREVIATIONS

A

AC	: Alternating Current
ACC	: Automatic Color Control
A/CTL	: Audio/Control
ADC	: Analog to Digital Converter
ADD	: Adder
ADJ	: Adjustment
A DUB	: Audio Dubbing
AE	: Audio Erase
AEF	: Automatic Editing Function
AFC	: Automatic Frequency Control
AFT	: Automatic Fine Tuning
AGC	: Automatic Gain Control
AH	: Audio Head
AHD	: Audio High Density Disk
AL	: After Loading
ALC	: Automatic Light Compensation Automatic Level Control
ALM	: Alarm
ALU	: Arithmetic Logic Unit
AM	: Amplitude Modulation
AMP	: Amplifier
ANT	: Antenna
APC	: Automatic Pedestal Control Automatic Phase Control
APL	: Average Picture Level
A S/M	: Audio Servo/Mechacon
ASS'Y	: Assembly
ATT	: Attenuator
AUD	: Audio
AUTO	: Automatic
AUX	: Auxiliary

B

B	: **Base, Blue**
BAL	: Balance
BATT	: Battery
BBD	: Bucket Brigade Device
BCD	: Binary Coded Decimal
BEG	: Beginning
BF	: **Behind Focus**
BFP	: Burst Flag Pulse
BIT	: Binary Digit
BLK	: Black, Blanking
BLU	: Blue
BNC	: Bayonet Connector
BOT	: Beginning of Tape
BPF	: Bandpass Filter
BRK	: Brake
BRN	: Brown
BRT	: Brightness
BT	: Band Tuning
BUFF	: Buffer
BW or B/W	: Black and White

C

C	: Capacitance, Collector, Color
CAL	: Calibration
CAP	: Capstan, Capacitor
CAR	: Carrier
CARR	: Carrier
CASS	: Cassette
CC	: Cassette Compartment
CCD	: Charge Coupled Device
CCT	: Circuit
CdS	: Cadmium Sulphide
CD	: Count Down
CE	: Chip Enable
CF	: **Ceramic Filter, Color Frame, Correct Focus**
CH	: Channel
CHG	: Charge
CHROMA	: Chrominance
CLK	: Clock
CLR	: Clear
CMD	: Command
CMOS	: Complementary Metal Oxide Semiconductor
CNT	: Count, Counter
COL	: Color
COM	: Common
COMB	: Combination Comb Filter
COMP	: Comparator Composite Compensation
CONN	: Connector
CONV	: Converter
CP	: Circuit Protector Clamp Pulse
CPC	: Capstan Phase Control
CPU	: Central Processing Unit
CTC	: Crosstalk Cancel
CTL	: Control

D

D	: Drum, Digital, Diode, Drain
DAC	: Digital to Analog Converter
dB	: Decibel
DC	: Direct Current
DD	: Direct Drive
DEC	: Decoder
DEMOD	: Demodulator
DEMUX	: Demultiplexer
DET	: Detector
DEV	: Deviation
DFRS	: Drum Free Running Stop
DG	: Differential Gain
DIF	: Differential
DISCR	: Discriminator
DL	: Delay Line
DOC	: Dropout Compensator
DOD	: Drop Out Detector
DP	: Differential Phase
DPC	: Drum Phase Control
DYAC	: Dynamic Aperture Control

E

E	: Edit, Emitter
EDP	: Electronic Data Processing
E-E	: Electric to Electric
EF	: Emitter-Follower
EMP	: Emphasis
EN	: Enable
ENC	: Encoder
ENV	: Envelope
EOT	: End of Tape
EP	: Extended Play
EQ	: Equalizer
ES	: Electronic Switch
ESNS	: End Sensor
EXP	: Expander
EXT	: External

F

F	: Farad, Fuse
F ADV	: Frame Advance
FDP	: Fluorescent Display Panel
FE	: Full Erase
FET	: Field Effect Transistor
FF	: **Fast Forward, Front Focus** Flipflop
FG	: Frequency Generator
FM	: Frequency Modulation
FMA	: FM Audio
FR	: Full Recording, Frame, Fusible Resistor
FREQ	: Frequency
F-V CONV	: Frequency to Voltage Converter
FWD	: Forward
FWD S	: Forward Search

G

G	: Green, Gate, Grid
GEN	: Generator
GND	: Ground
GRN	: Green
GRY	: Gray

H

H	: High, Henry, Hour
HBF	: Horizontal Burst Flag
HD	: Horizontal Drive
HG	: Hall Generator
HPF	: Highpass Filter
Hz	: Herz

I	IC	: Integrated Circuit
	ID	: Identification (Pulse)
	IF	: Intermediate Frequency
	IFR	: Infrared
	IFT	: Intermediate Frequency Transformer
	IND	: Indicator
	INH	: Inhibit
	INS	: Insert
	INT	: Internal, Interrupt
	INV	: **Inverter, Interleave**
	I/O	: Input/Output
	IR	: Infrared
L	L	: Low, Left
	LCD	: Liquid Crystal Display
	LED	: Light Emitting Diode
	LIM	: Limiter
	LIN	: Linearity
	LLD	: Low Light Detector
	LOAD	: Loading (Cassette)
	LP	: Long Play
	LPF	: Lowpass Filter
	LSB	: Lower Sideband
M	M	: Motor, Mega
	MAX	: Maximum
	MDA	: Motor Drive Amplifier
	MECHACON	: Mechanism Control
	MIC	: Microphone
	MIN	: Minimum
	MIX	: Mixer, Mixing
	MMV	: Monostable Multivibrator
	MNOS	: Metal Nitride Oxide Semiconductor
	MOD	: Modulation, Modulator
	MODEM	: Modulator-Demodulator
	MON	: Monitor
	MOS	: Metal Oxide Semiconductor
	MPX	: Multiplexer, Multiplex
	MS	: Mode Select
	MUT	: Muting
N	NAND	: Not-And
	NC	: Not Connected, Normally Closed
	NFB	: Negative Feedback
	NLN	: Non-Linear
	NO	: Normally Open
	NOR	: Normal, Not-Or
	NR	: Noise Reduction
O	OP	: Operation
	OPAMP	: Operational Amplifier
	ORN	: Orange
	OSC	: Oscillator
P	PB	: Playback
	PC	: Photocoupler, Pulse Counter
	PCM	: Pulse Code Modulation
	PG	: Pulse Generator
	PGM	: Program
	PI	: Photo Interrupter
	PIF	: Picture Intermediate Frequency
	PLA	: Programmable Logic Array
	PLL	: Phase Locked Loop
	POS	: Position
	p-p	: Peak-to-Peak
	PR	: Pinch Roller
	PREAMP	: Preamplifier
	PRL	: Preroll
	P/S	: Pause/Still
	PSC	: Pulse Swallowing Control
	PU	: Pickup
	PUT	: Programmable Unijunction Transistor
	PWB	: Printed Wiring Board
	PWM	: Pulse Width Modulation
	PWR	: Power
Q	Q	: Quality Factor
R	R	: Red, Right
	RA	: Resistor Array
	RAM	: Random Access Memory
	REC	: Recording
	REF	: Reference
	REG	: Regulated, Regulator
	REM	: Remote
	REMOCON	: Remote Control (Unit)
	REV	: Reverse
	REV S	: Reverse Search
	REW	: Rewind
	RF	: Radio Frequency
	ROM	: Read Only Memory
	R/P	: Record/Playback
	RPT	: Repeat
	RS FF	: RS Flipflop
	RST	: Reset
	RT	: Rotary Transformer
	RUN	: Running
	RY	: Relay
S	SAW	: Sawtooth, Surface Acoustic Wave
	SC	: Subcarrier, Simulcast
	SCH	: Search
	SEL	: Select, Selector
	SENS	: Sensor
	SEP	: Separator
	SF	: Source Follower
	SFF	: Short Fast Forward
	SIF	: Sound Intermediate Frequency
	SN	: Signal to Noise Ratio
	SOL	: Solenoid
	SOS	: Sound on Sound
	SP	: Standard Play
	SR	: Supply Reel
	SREW	: Short Rewind
	S/S	: Slow/Still
	SSG	: Sync Signal Generator
	SSNS	: Start Sensor
	STD	: Strobe Data, Standard
	SUP	: Supply
	SW	: Switch
	SWD	: Switched
	SYNC	: Synchronization
	SYSCON	: System Control
T	TAL	: Tally
	TBC	: Time Base Corrector
	TC	: Tension Control, Time Code
	TEN	: Tension
	TF	: Thermal Fuse
	TIM	: Timing
	TK	: Tracking
	TNR	: Tuner
	TP	: Test Point
	TPZD	: Trapezoid
	TR	: Transistor, Trimmer
	TRANS	: Transformer
	T/T	: Tuner/Timer
	TU	: Take-up
U	UL	: Unloading -
	UNREG	: Unregulated
	UNSW	: Unswitched
V	V	: Vertical, Volt
	VACT	: Video Action
	VCO	: Voltage Controlled Oscillator
	VD	: Vertical Drive
	VIF	: Video Intermediate Frequency
	VLT	: Violet
	VR	: Variable Resistor
	VS	: Video and Sync
	VSCH	: Variable Search
	V/T	: Video/Television
	V/U	: VHF/UHF
	VXO	: Variable Crystal Oscillator
W	W	: Watt
	WARN	: Warning
	W & D	: White and Dark
	WHT	: White
	WV	: Working Voltage
X	XTAL	: Crystal
Y	Y	: Luminance
	YEL	: Yellow

4.5 COMPONENT TERMINAL D.C VOLTAGE TABLES

4.5.1 [0][1] MAIN (REGULATOR SECTION)

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	SP PLAY
IC1 ①	0	0
②	10.3	9.9
③	4.9	4.9

■ TRANSISTORS

TR NO. \ MODE	STOP			SP PLAY		
	E	C	B	E	C	B
Q1	10.1	0	10.1	10.0	0	10.3
Q2	4.9	0	4.9	4.9	0	4.9
Q3	0	10.1	0	0	10.0	0
Q4	0	10.1	0	0	10.0	0

4.5.2 [0][1] MAIN (SERVO SECTION)

■ INTEGRATED CIRCUITS

IC NO. \ MODE	SP PLAY	LP PLAY
IC101 ①	0	0
②	1.6	1.6
③	1.9	2.0
④	1.6	1.6
⑤	1.9	1.9
⑥	2.4	2.3
⑦	2.2	2.2
⑧	0	0
⑨	2.4	2.4
⑩	0	0.4
⑪	1.8	1.9
⑫	5.1	5.0
⑬	0	0.6
⑭	2.4	2.6
⑮	2.6	2.6
⑯	2.2	2.4
⑰	0.5	0.5
⑱	2.5	2.2
⑲	2.6	2.2
⑳	2.5	2.4
㉑	2.4	2.7
㉒	4.6	0
㉓	2.6	2.6
㉔	2.6	2.6
㉕	0	0.2
㉖	0	0.3
㉗	0	0.1
㉘	4.6	4.6
㉙	4.2	4.2
㉚	0.4	0.4
㉛	0	0
㉜	0.4	0.4
㉝	4.9	4.9
㉞	0	0
㉟	0	0
㊱	0	0
㊲	2.2	1.8
㊳	1.8	2.7
㊴	1.3	1.3
㊵	1.7	1.7
㊶	3.4	2.7
㊷	3.4	3.0
㊸	3.4	3.4
㊹	3.4	3.3

IC NO. \ MODE	SP PLAY	LP PLAY
IC102 ①	1.3	1.3
②	1.4	1.4
③	1.3	1.3
④	0	0
⑤	1.9	1.9
⑥	2.6	3.1
⑦	0.4	0.4
⑧	5.1	5.1
IC103 ①	1.2	1.2
②	1.2	1.2
③	0	0
④	1.2	1.3
⑤	2.6	2.7
⑥	2.0	2.1
⑦	2.4	2.4
⑧	8.0	8.1
IC104 ①	0	0
②	1.7	1.7
③	2.5	2.5
④	2.4	2.5
⑤	2.5	2.5
⑥	1.9	1.9
⑦	2.0	2.0
⑧	3.1	3.1
⑨	3.0	3.0
⑩	5.1	5.1
⑪	0	0
⑫	0	0
⑬	0.9	5.6
⑭	0	0
⑮	0.9	0.6

■ INTEGRATED CIRCUITS

IC NO. \ MODE	SP PLAY	LP PLAY
IC104 ⑯	2.8	3.6
⑰	2.5	2.5
⑱	2.4	2.4
⑲	2.5	2.5
⑳	8.0	8.0
IC105 ①	5.0	5.0
②	0.4	0.4
③	4.6	0
④	0.4	0.4
⑤	4.5	4.5
⑥	5.0	4.9
⑦	0	0
⑧	0	0
⑨	0	0
⑩	0	0
⑪	0	5.0
⑫	0	0
⑬	3.8	4.2
⑭	3.8	4.2
⑮	3.8	4.2
⑯	4.9	4.9
⑰	5.0	0
⑱	0	5.0
⑲	0	0
⑳	5.0	5.0
IC106 ①	0	0
②	2.4	2.3
③	2.6	2.6
④	2.6	2.6
⑤	2.6	2.6
⑥	2.5	2.5
⑦	2.5	2.5

IC NO. \ MODE	SP PLAY	LP PLAY
IC106 ⑧	5.1	5.1
⑨	0	0
⑩	2.4	0
⑪	1.3	1.4
⑫	2.6	2.6
⑬	2.6	2.6
⑭	2.6	2.6
⑮	2.4	2.4
⑯	0	0
IC107 ①	1.9	1.2
②	1.9	1.2
③	0	0
④	4.5	4.5
⑤	0	0
⑥	0.4	0.4
⑦	1.7	1.1
⑧	1.9	1.2
⑨	5.1	5.1
⑩	1.1	0.5
IC108 ①	1.6	0
②	0	0
③	0	0
④	0	0
⑤	5.1	5.1

■ TRANSISTORS

TR NO. \ MODE	SP PLAY			LP PLAY		
	E	C	B	E	C	B
Q101	0	0	4.6	0	2.4	0
Q102	–	–	–	–	–	–
Q103	–	–	–	–	–	–
Q104	2.2	2.4	2.0	2.3	2.4	2.0
Q105	2.3	2.4	2.0	2.4	2.4	2.0
Q106	2.3	2.4	2.0	2.3	2.4	2.0
Q107	2.3	2.4	1.9	2.3	2.4	1.9
Q108	–	–	–	–	–	–
Q109	–	–	–	–	–	–
Q110	3.0	1.9	2.0	3.1	1.9	2.0
Q111	0	0.1	0	0	0	0
Q112	0	0.9	0	0	0	4.9
Q113	0	0	4.9	0	0.6	0
Q114	–	–	–	–	–	–
Q115	1.9	0	1.8	2.4	0	1.2
Q116	1.8	0	1.8	2.4	0	1.2
Q117	1.9	1.7	1.1	2.3	1.1	0.5
Q118	1.8	1.7	1.1	2.4	1.1	0.5
Q119	0	2.2	0	0	1.2	0.5
Q120	0	1.1	0	0	0	5.0
Q121	4.2	0	3.8	4.2	0	3.8
Q122	3.8	5.0	4.2	4.8	5.0	4.4

Note: Voltage at every part of [0][1] MAIN board was measured with a digital voltmeter (DC range) with the following input signals:
1) Color bars in REC mode
2) In PB mode, playback of the alignment tapes of MH-C2 (color bars segment in SP mode) and CH-C5L (in LP mode).

4.5.3 [0][1] MAIN (AUDIO SECTION)

■ INTEGRATED CIRCUITS

IC NO. \ MODE	SP PLAY	SP REC
IC301 ①	2.4	2.3
②	2.2	2.2
③	2.3	2.2
④	2.3	2.3
⑤	2.3	2.3
⑥	2.3	2.3
⑦	2.4	2.4
⑧	2.4	2.4
⑨	2.4	2.5
⑩	4.8	4.7
⑪	2.4	2.3
⑫	2.4	2.4
⑬	0	0
⑭	0	0.4
⑮	0	0
⑯	0	4.7
⑰	2.4	2.3
⑱	2.2	2.2
⑲	4.7	4.7
⑳	2.4	2.3
IC302 ①	0	7.6
②	0	7.6
③	0	0
④	0	3.3
⑤	4.8	4.7
⑥	0	0
⑦	0	0

■ TRANSISTORS

TR NO. \ MODE	SP PLAY			SP REC		
	E	C	B	E	C	B
Q301	—	—	—	—	—	—
Q302	0	3.8	0	0	0	3.3
Q303	0	0	3.8	0	4.7	0
Q304	0	0	4.6	0	4.6	0
Q305	0	0	0	0	0	0
Q306	0	0	0	0	0	0
Q307	0	0	0	0	0	0
Q308	0	4.7	0	0.4	4.7	0
Q309	4.7	0	4.7	4.7	0	4.7
Q310	8.0	0	8.0	8.0	7.8	0
Q311	0	8.0	0	0	0	3.3
Q312	0	0	0	7.9	7.7	0

4.5.4 [0][1] MAIN (MECHACON SECTION)

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP
IC401 ①	5.0
②	4.9
③	4.9
④	4.9
⑤	4.9
⑥	4.9
⑦	4.9
⑧	4.9
⑨	4.9
⑩	0
⑪	4.8
⑫	0
⑬	4.9
⑭	0
⑮	4.9
⑯	4.9
⑰	4.9
⑱	3.1
⑲	5.1
⑳	4.8
㉑	0
㉒	0
㉓	4.9
㉔	5.0
㉕	0
㉖	4.9
㉗	4.9
㉘	4.9
㉙	4.9
㉚	4.9
㉛	4.9
㉜	0
㉝	4.9
㉞	0
㉟	0
㊱	0
㊲	0
㊳	0
㊴	0
㊵	4.8
㊶	5.0
㊷	0
㊸	4.7
㊹	5.0
㊺	0
㊻	0
㊼	4.7
㊽	0
㊾	0
㊿	0
(51)	4.7
(52)	0
(53)	0
(54)	0
(55)	0
(56)	0
(57)	0
(58)	0
(59)	4.9
(60)	5.1
(61)	4.9
(62)	1.8
(63)	1.3
(64)	0
IC403 ①	4.9
②	5.1
③	4:9
④	5.0
⑤	4.9
⑥	5.1
⑦	4.8
⑧	4.9
⑨	4.9
⑩	0

IC NO. \ MODE	STOP
IC403 ⑪	4.9
⑫	4.9
⑬	0
⑭	4.9
⑮	4.5
⑯	4.9
⑰	4.9
⑱	4.9
⑲	4.9
⑳	5.0
IC404 ①	4.9
②	0
③	4.9
④	0
⑤	4.9
⑥	0
⑦	4.9
⑧	0
⑨	4.9
⑩	0
⑪	0.6
⑫	0
⑬	0.3
⑭	0
⑮	5.1
⑯	4.9
⑰	4.7
⑱	4.9
⑲	4.9
⑳	5.0
IC405 ①	4.9
②	4.6
③	4.9
④	4.6
⑤	4.9
⑥	4.5
⑦	4.9
⑧	4.6
⑨	4.9
⑩	0
⑪	5.1
⑫	4.9
⑬	0
⑭	4.9
⑮	5.1
⑯	4.9
⑰	5.1
⑱	4.9
⑲	4.9
⑳	5.0
IC406 ①	0
②	0
③	0
④	0
⑤	0
⑥	0
⑦	10.5
⑧	10.5
⑨	0
⑩	0
IC407 ①	0
②	3.1
③	2.6
④	5.1
⑤	0
⑥	2.6
⑦	0

IC NO. \ MODE	STOP
IC407 ⑧	0.6
⑨	0.2
⑩	0
⑪	0
⑫	2.5
⑬	3.0
⑭	0
IC408 ①	0
②	0
③	0
④	5.0
⑤	0
⑥	5.0
⑦	0
⑧	4.5
⑨	0
⑩	5.0
⑪	4.9
⑫	5.0
⑬	4.7
⑭	5.0
IC409 ①	0.7
②	5.0
③	0.7
④	5.0
⑤	0
⑥	5.0
⑦	0
⑧	0
⑨	4.4
⑩	0
⑪	4.7
⑫	5.0
⑬	0
⑭	5.0
IC410 ①	5.0
②	0
③	5.0
④	0
⑤	4.2
⑥	4.2
⑦	0
⑧	0
⑨	4.5
⑩	5.0
⑪	5.0
⑫	0
⑬	0
⑭	5.0
IC411 ①	0
②	0
③	0
④	5.0
⑤	4.5
⑥	4.5
⑦	0
⑧	5.0
⑨	5.0
⑩	5.0
⑪	5.0
⑫	5.0
⑬	5.0
⑭	5.0

■ TRANSISTORS

MODE / TR NO.	STOP		
	E	C	B
Q402	0	10.5	0
Q403	0	4.9	0
Q404	0	8.0	0
Q405	0	3.3	0
Q406	0	0	4.8
Q407	0	0	5.0
Q408	0	0	4.9
Q409	0	4.5	0
Q410	0	0	4.7
Q411	0	5.0	0
Q412	0	10.5	0
Q413	10.5	0	10.5

4.5.5 [0][1] MAIN

■ CONNECTORS

MODE / CN NO.	STOP	SP PLAY	LP PLAY	SP REC
CN1 ①	10.5	10.4	–	–
②	0	0	–	–
③	0	0	–	–
CN2 ①	–	0	–	7.6
②	–	0	–	7.6
CN3 ①	–	0	–	0
②	–	0	–	0
CN4 ①	–	0	–	0
②	–	0	–	0
③	–	0	–	0
④	–	5.1	–	5.1
CN5 ①	–	5.1	5.1	–
②	–	0	0	–
③	–	2.6	2.6	–
④	–	6.8	6.8	–
⑤	–	4.8	4.8	–
⑥	–	0	0	–
⑦	–	0	0	–
CN6 ①	–	0	0	–
②	–	0	0	–
CN7 ①	–	0	0	–
②	–	0	0	–
③	–	2.7	3.4	–
④	–	3.1	0	–
⑤	–	0	0	–
⑥	–	3.0	3.4	–
⑦	–	2.9	2.9	–
⑧	–	0	0	–

MODE / CN NO.	STOP	SP PLAY	LP PLAY	SP REC
CN8 ①	–	3.1	3.1	–
②	–	0	0	–
③	–	8.0	8.0	–
④	–	5.1	5.1	–
⑤	–	5.1	5.1	–
⑥	–	0	0	–
⑦	–	0	0	–
⑧	–	0	0	–
⑨	–	0	0	–
⑩	–	0	0	–
CN9 ①	–	4.9	4.9	–
②	–	4.8	4.8	–
③	–	0	0	–
④	–	4.9	4.9	–
⑤	–	4.9	4.9	–
⑥	–	4.9	4.9	–
⑦	–	0	0	–
⑧	–	0	0	–
⑨	–	0	0	–
⑩	–	0	0	–
⑪	–	4.9	4.9	–
⑫	–	5.1	0	–
⑬	–	5.1	5.1	–
⑭	–	5.1	5.1	–
⑮	–	4.6	4.6	–
⑯	–	4.6	4.6	–
CN10A ①	–	4.9	4.9	–
②	–	4.9	4.9	–
③	–	4.9	4.9	–
④	–	4.9	4.9	–
⑤	–	0	0	–
CN10B ①	–	0	0	–
②	–	0	0	–
③	–	0	0	–
④	–	0	0	–
⑤	–	0	0	–
⑥	–	0	0	–
⑦	–	0	0	–
CN11 ①	–	0	0	–
②	–	5.1	5.1	–
③	–	0	0	–
④	–	4.9	4.9	–
⑤	–	2.7	2.7	–
⑥	–	0	0	–
⑦	–	0	0	–
⑧	–	0	0	–
⑨	–	8.0	8.0	–
⑩	–	0	0	–
CN12 ①	–	3.0	3.1	–
②	–	0	0	–
③	–	0	0	–
④	–	0	0	–
⑤	–	0	0	–
⑥	–	0	0	–
⑦	–	0	0	–
⑧	–	0	0	–
⑨	–	0	0	–
⑩	–	3.1	3.1	–

4.5.6 [0][2] Y/C

■ CONNECTORS

CN NO. \ MODE	STOP	SP PLAY	LP PLAY	SP REC
CN13 ①	–	0	0	–
②	–	0	0	–
③	–	0	0	–
④	–	0	0	–
⑤	–	0	0	–
⑥	–	0	0	–
⑦	–	0	0	–
				–
CN14 ①	–	0	0	–
②	–	0	0	–
CN15 ①	–	0	0	–
②	–	0	0	–
③	–	0	0	–
CN16 ①	–	0	0	–
②	–	0	0	–
CN17 ①	–	0	0	–
②	–	0	0	–
③	–	0	0	–
④	–	2.5	2.5	–
⑤	–	2.5	2.5	–
CN18 ①	0	–	–	–
②	0	–	–	–
③	10.5	–	–	–
④	0	–	–	–
⑤	8.1	–	–	–
⑥	4.6	–	–	–
⑦	0	–	–	–
⑧	0	–	–	–
⑨	5.1	–	–	–
⑩	0	–	–	–
⑪	0	–	–	–
⑫	0	–	–	–
⑬	0	–	–	–
⑭	0	–	–	–
CN19 ①	5.1	–	–	–
②	0	–	–	–
③	5.1	–	–	–
④	0	–	–	–
CN20 ①	0	–	–	–
②	0	–	–	–
③	0	–	–	–
④	2.2	–	–	–
CN21 ①	0	–	–	–
②	0	–	–	–
③	0	–	–	–

■ INTEGRATED CIRCUITS

IC NO. \ MODE	SP PLAY	LP PLAY	SP REC	LP REC
IC1 ①	2.3	2.7	1.7	2.2
②	0.4	0.4	0	0
③	2.7	2.7	2.2	2.7
④	2.8	2.8	2.8	2.8
⑤	2.1	2.2	2.4	2.4
⑥	3.0	0	3.0	3.0
⑦	1.3	1.3	1.3	0
⑧	1.5	1.5	1.5	1.5
⑨	0	0	0	0
⑩	1.9	2.0	1.9	1.9
⑪	0	0	0	0
⑫	2.6	2.6	4.5	4.5
⑬	2.5	2.4	0.4	0.4
⑭	3.0	3.0	0.7	0.6
⑮	3.6	3.6	3.2	3.2
⑯	3.0	2.7	2.7	2.7
⑰	4.1	4.1	4.0	4.0
⑱	4.1	4.1	4.0	4.0
⑲	2.6	2.6	0	2.7
⑳	1.9	1.9	1.9	1.9
㉑	0	2.0	2.0	2.0
㉒	2.0	0	2.1	2.0
㉓	4.8	4.8	4.9	4.0
㉔	3.7	3.9	4.0	3.3
㉕	0.5	1.9	0.5	0
㉖	2.9	3.1	3.1	3.1
㉗	1.7	2.3	0	2.3
㉘	1.3	1.3	0	0
IC2 ①	3.4	3.4	0	0
②	1.3	1.3	0	0
③	0	0	0	0
④	1.8	0	1.7	0
⑤	1.8	1.8	0	0
⑥	4.7	4.7	0	0
⑦	3.3	3.3	0	0
⑧	3.5	3.5	0	0
⑨	2.8	2.8	0	0
⑩	3.5	3.5	0	0
IC3 ①	2.7	2.7	0	0
②	3.2	3.2	0	0
③	3.4	3.4	0	0
④	1.3	1.3	0	0
⑤	2.4	2.4	0	0
⑥	0	0	0	0.1
⑦	1.8	1.8	0	0
⑧	4.7	4.7	0	0
⑨	3.3	3.3	0	0
⑩	3.5	3.5	0	0
⑪	2.8	2.8	0	0
⑫	3.5	3.5	0	0
⑬	3.5	3.5	0	0
⑭	3.5	3.5	0	0
⑮	0	0.8	0	0
⑯	0	1.2	0	0
⑰	0	0	0	0
⑱	0	2.1	0.1	0
⑲	0	2.1	0.1	0.1
⑳	0	0	0	0
㉑	3.6	3.6	0	0
㉒	3.2	0	0	0
㉓	4.7	4.7	0	0
㉔	3.1	3.1	0	0
㉕	1.8	1.8	0	0
㉖	3.1	3.1	0	0
㉗	3.5	3.5	0	0
㉘	4.7	4.7	0	0

Note: Voltage at every part of [0][2] Y/C board was measured with a digital voltmeter (DC range) with the following input signals:
1) Color bars in REC mode
2) In PB mode, playback of the alignment tapes of MH-C2 (color bars segment in SP mode) and CH-C5L (in LP mode).

IC NO. \ MODE	SP PLAY	LP PLAY	SP REC	LP REC
IC4 ①	1.2	1.2	0	0
②	0.6	0.8	0	0
③	0	0	0	0
④	0	0.8	0	0
⑤	3.5	3.5	0	0
⑥	3.5	3.5	0	0
IC5 ①	0	0	0	0
②	5.0	5.0	5.0	5.0
③	4.2	4.2	4.2	4.2
④	0	0	0	0
⑤	0.1	4.8	0	4.9
⑥	0	0	0	0
⑦	0	4.8	0	0
⑧	3.0	0	5.0	5.0
⑨	4.6	0	4.6	0.4
IC6 ①	0	0	0	0
②	2.7	2.7	2.7	2.7
③	2.8	2.8	2.8	2.8
④	0	0	5.0	5.0
⑤	1.3	1.3	1.3	1.3
⑥	1.2	1.2	1.2	1.2
⑦	0	0	0	0
⑧	4.8	4.8	4.8	4.8
⑨	2.3	2.2	2.2	2.2
⑩	0	0	0	0
⑪	4.8	5.0	4.8	4.8
⑫	3.2	3.1	3.2	3.1
⑬	0	0	0	0
⑭	3.1	3.0	3.0	0
⑮	0	0	0	0
⑯	0.2	0.2	0.2	0.2
⑰	4.3	4.3	0	0
⑱	2.8	3.0	2.8	2.8
⑲	7.9	7.9	7.9	7.9
⑳	4.9	4.9	0	0.1
㉑	2.8	2.8	2.8	2.8
㉒	2.8	2.8	2.8	2.8
㉓	3.5	3.5	3.6	3.6
㉔	0.7	3.2	3.0	3.1
㉕	3.0	3.0	3.2	3.2
㉖	2.7	2.7	2.9	2.9
㉗	0	2.7	2.9	2.9
㉘	3.4	3.4	3.5	3.5
IC7 ①	0	0	0	0
②	3.5	3.6	0.2	0.2
③	3.3	3.4	3.2	3.2
④	4.9	4.9	0	0
⑤	5.0	5.0	0	5.0
⑥	4.2	4.2	4.2	4.2
IC8 ①	0	0	8.0	8.0
②	8.1	8.1	8.1	8.1
③	4.3	4.3	0.1	0.1
④	0	0	0	0
⑤	4.9	4.9	0	0
⑥	0	0	5.0	5.0
⑦	0	0	5.0	5.0
⑧	0	4.9	0	0
⑨	5.0	5.0	5.0	5.0

IC NO. \ MODE	SP PLAY	LP PLAY	SP PLAY	LP PFAY
IC9 ①	5.0	4.7	4.9	5.0
②	0	0	0	0
③	5.0	5.0	5.0	5.0
④	3.5	3.5	0.1	0.1
⑤	0	0	0	0
⑥	2.8	2.9	2.8	2.8
⑦	2.2	2.3	2.1	2.1
⑧	0	4.8	0	0
⑨	0	0	0	0
⑩	2.7	2.7	2.6	2.6
IC10 ①	2.7	2.7	2.4	2.4
②	0	0	0	0
③	0	0	0	0
④	0	0	0	0
⑤	5.0	5.0	5.0	5.0
⑥	0	0	0	0
⑦	3.0	3.0	0	0
⑧	2.6	2.6	2.6	2.8
⑨	2.7	2.7	2.7	2.7
⑩	0.1	0.2	0	0.2
⑪	4.9	4.9	0	0
⑫	0	0	0.3	0
⑬	0	0.3	0	0
⑭	0.4	0.4	0.4	0.4
⑮	3.9	3.9	3.9	3.9
⑯	0	0	0	0
⑰	2.9	2.9	2.9	2.9
⑱	3.2	3.2	2.7	2.7
⑲	0	0	0	0
⑳	0	0	0	0
㉑	0	0	5.0	5.0
㉒	0	0	0	0
㉓	0	0	0	0
㉔	1.3	1.3	1.3	1.3
㉕	2.8	2.8	2.8	2.8
㉖	2.0	2.5	2.6	2.3
㉗	2.5	2.5	2.6	2.6
㉘	3.5	3.5	0.1	0.1
IC11 ①	2.6	2.6	2.8	2.8
②	1.0	2.2	2.2	2.2
③	0	0	0	0
④	0	0	0	0
⑤	4.9	4.9	5.0	5,0
⑥	1.2	1.2	1.4	1.4
⑦	0	0	0	0
⑧	2.6	2.6	2.8	2.8

TR NO. \ MODE	SP PLAY			LP PLAY			SP REC			LP REC		
	E	C	B	E	C	B	EE	C	B	E	C	B
Q1	0	2.7	1.9	0	2.5	2.3	0	2.4	2.3	0	2.6	2.0
Q2	0	1.5	0.4	0	1.5	0.4	0	1.5	0.4	0	1.5	0.4
Q3	1.4	3.2	2.6	1.4	3.2	2.0	0	3.2	2.0	1.4	3.2	2.0
Q4	2.6	4.9	3.2	2.6	4.9	0	2.6	4.9	3.2	2.6	5.0	3.2
Q5	0	3.3	0.4	0	3.3	0.4	0	3.3	0.4	0	3.3	0.4
Q6	0	0.1	3.3	0	0.1	3.3	0	0.1	3.3	0	0.1	3.3
Q7	0	0.1	0.1	0	0	4.8	0	0.1	0.1	0	0	4.9
Q8	0	0	4.6	0	0.1	0.1	0	0	4.6	0	0.2	0.4
Q9	1.8	4.8	2.3	1.7	4.8	2.3	1.7	4.8	2.3	1.8	4.8	2.3
Q10	—	—	—	—	—	—	—	—	—	—	—	—
Q11	0	0	0.1	0.3	0.3	1.0	0	0	0.1	0	0	0.1
Q14	2.4	3.1	5.0	2.4	3.1	0	1.9	2.7	5.0	2.0	2.7	5.0

■ CONNECTORS

MODE / CN NO.	SP PLAY	LP PLAY	SP REC	LP REC
CN1 ①	0	0	0	0
②	0	0.7	0.5	0
CN2 ①	0	0	0	0
②	0	0	0	0
CN3 ①	0	0	0	0
②	5.1	5.1	5.1	5.1
③	0	0	5.0	5.0
④	4.9	4.9	0	0
⑤	2.7	4.3	0	0
⑥	0	0	0	0
⑦	0	0	0	0
⑧	0.4	0.4	0.4	0.4
⑨	8.0	8.0	8.0	8.0
⑩	0	0	0	0
CN4 ①	3.0	3.0	2.9	2.9
②	0	0	0	0
③	0	0	0	0
④	0	0	0	0
⑤	0	0	5.0	5.0
⑥	0	0	5.0	5.0
⑦	4.6	0	4.6	0.4
⑧	2.4	1.9	2.4	1.7
⑨	0	0	0	0
⑩	3.0	3.1	2.9	3.0
CN5 ①	0	0	0	0
②	2.3	2.3	2.4	2.4
③	2.6	2.6	2.6	2.4
④	0	0	0	0
⑤	0	0	0	0
⑥	5.6	5.6	5.5	5.5
⑦	0	0	4.1	4.1
⑧	5.0	5.0	5.0	0
⑨	2.4	2.4	2.0	2.0
⑩	4.2	4.2	4.2	4.2
⑪	2.5	2.5	2.6	2.6
⑫	3.2	3.2	3.2	3.2

4.5.7 [0][3] OPERATION

■ INTEGRATED CIRCUITS

MODE / IC NO.	STOP
IC1 ①	4.9
②	4.9
③	3.7
④	3.7
⑤	3.6
⑥	3.7
⑦	4.8
⑧	0
⑨	0
⑩	3.6
⑪	0
⑫	0
⑬	0
⑭	0
⑮	4.9
⑯	5.0

MODE / IC NO.	STOP
IC2 ①	4.9
②	4.9
③	4.9
④	4.9
⑤	4.9
⑥	4.9
⑦	4.9
⑧	0
⑨	0
⑩	0
⑪	4.9
⑫	5.0
⑬	4.9
⑭	4.9
⑮	4.9
⑯	4.9

Note: Voltage at every part of [0][3] OPERATION board was measured with a digital voltmeter (DC range).

■ TRANSISTOR

MODE / TR NO.	STOP		
	E	C	B
Q1	0	0	4.8
Q2	–	–	–
Q3	0	0	0
Q4	0	0	0
Q5	0	4.9	0
Q6	–	–	–
Q7	5.1	0	4.6
Q8	0	8.0	0

■ CONNECTORS

MODE / CN No.	STOP
CN1 ①	0
②	0
③	8.0
④	5.1
⑤	5.1
⑥	0
⑦	0
⑧	0
⑨	0
⑩	4.7

MODE / CN NO.	STOP
CN2 ①	4.9
②	4.8
③	0
④	4.9
⑤	0
⑥	4.9
⑦	0
⑧	0
⑨	0
⑩	0
⑪	4.9
⑫	5.1
⑬	5.1
⑭	5.1
⑮	4.6
⑯	4.6

MODE / CN No.	STOP
CN3 ①	0
②	3.1
③	0
④	4.9
⑤	3.1
⑥	3.1
⑦	0
⑧	3.1
⑨	0
⑩	0

4.5.8 [0][5] MDA

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	SP PLAY
IC251 ①	1.0	1.0
②	2.4	2.4
③	2.3	2.4
④	3.7	1.3
⑤	3.8	3.7
⑥	2.0	1.9
⑦	2.0	1.9
⑧	2.0	1.9
⑨	0	2.4
⑩	5.1	5.0
⑪	2.0	1.9
⑫	0	2.2
⑬	0	0
⑭	0.8	0
⑮	1.2	2.5
⑯	0	2.5
⑰	0	0
⑱	0	2.4
⑲	3.0	6.4
⑳	0	2.5
㉑	0	0.9
㉒	3.5	1.4
㉓	5.0	4.1
㉔	0.9	1.0

■ CONNECTORS

CN NO. \ MODE	STOP	SP PLAY
CN-M1 ①	2.3	2.3
②	1.0	1.0
③	2.3	2.3
④	0.2	0.3
⑤	0.9	1.0
⑥	3.8	3.7
⑦	4.4	4.4
⑧	3.7	3.7
⑨	0	2.6
⑩	0	2.5
⑪	0	2.4
⑫	2.0	1.9
⑬	2.0	1.9

4.5.9 [1][2] SKEW JUMP

■ INTEGRATED CIRCUITS

IC NO. \ MODE	SP PLAY	LP PLAY	SP REC	LP REC	STOP
IC1 ①	2.0	2.0	2.0	2.0	2.0
②	2.9	3.0	0.1	0	3.1
③	3.4	3.4	3.4	0	3.4
④	0	0	4.8	0	0
⑤	3.1	3.1	3.1	3.1	3.1
⑥	2.4	2.4	2.4	2.4	2.4
⑦	0	0	0	0	0
⑧	0	0	2.5	0	0.1
⑨	0	0	0	0	0
⑩	0	3.2	3.2	3.2	3.2
⑪	3.4	3.4	3.4	3.4	3.4
⑫	3.2	3.2	3.2	3.2	3.2
⑬	3.2	0	3.2	3.2	3.2
⑭	4.8	4.8	4.8	4.8	4.8
⑮	4.8	4.8	4.8	4.8	4.8
⑯	0	4.8	1.5	4.8	4.8
⑰	2.8	3.1	4.8	4.8	4.8
⑱	4.1	4.1	4.1	0.1	0.1
⑲	2.4	2.4	2.4	2.5	2.5
⑳	2.4	2.4	0	2.4	2.4
㉑	2.4	2.4	2.4	2.4	2.4
㉒	0.8	0.8	0.8	0.8	0.8
IC2 ①	8.9	8.9	8.9	8.9	2.8
②	0	0	0	0	2.2
③	4.9	4.9	5.0	5.0	0
④	3.3	3.3	3.3	3.3	0
⑤	3.0	3.0	3.1	3.1	2.8
⑥	0	2.3	2.3	2.3	0
⑦	1.6	1.6	1.6	1.6	1.4
⑧	4.8	4.8	4.8	4.8	5.0
IC3 ①	2.6	2.6	2.6	2.6	2.6
②	2.2	1.7	1.6	1.6	1.6
③	3.2	3.1	3.2	3.2	3.2
④	0	0	0	0	0
⑤	3.1	3.1	3.1	3.1	3.2
⑥	4.9	4.9	4.9	4.9	5.0
⑦	3.5	3.5	3.5	3.5	3.5

Note: Voltage at every part of [1][2] SKEW JUMP board was measured with a digital voltmeter (DC range) with the following input signals:
1) Color bars in REC mode
2) In PB mode, playback of the alignment tapes of MH-C2 (color bars segment in SP mode) and CH-C5L (in LP mode)

■ TRANSISTORS

TR NO. \ MODE	SP PLAY			LP PLAY			SP REC			LP REC			STOP		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
Q1	1.7	4.8	2.3	1.7	4.8	2.3	1.8	4.8	2.4	1.8	4.8	2.4	1.8	4.8	2.4
Q2	2.8	4.8	3.4	2.8	4.8	3.4	2.7	0	3.4	2.7	4.8	3.4	2.8	4.8	3.4
Q3	1.0	3.9	1.6	1.0	3.8	1.6	1.0	3.9	1.6	1.0	3.9	1.6	1.0	3.8	1.6
Q4	3.2	4.8	3.8	3.2	4.8	3.8	3.2	4.8	3.9	3.2	4.8	3.9	3.2	4.8	3.9
Q5	5.6	8.9	6.2	5.6	8.9	6.2	5.6	8.9	6.2	5.6	8.9	6.2	5.6	8.9	6.2
Q6	2.6	6.2	0	0.4	6.2	3.4	2.7	6.2	3.3	2.7	6.2	3.3	2.7	6.7	3.3
Q7	6.1	3.4	5.5	6.1	3.3	5.5	6.1	3.3	5.5	6.1	3.3	5.5	6.1	3.3	5.5
Q8	2.7	8.9	3.3	2.7	8.9	3.2	2.5	8.9	3.3	2.6	8.9	3.3	2.7	8.9	3.3
Q9	4.1	3.3	4.7	4.1	8.9	4.7	4.1	0	4.7	4.1	8.9	4.7	4.1	8.9	4.7
Q10	1.8	2.0	2.4	1.7	2.0	2.4	1.3	2.8	2.0	1.3	2.8	2.0	1.4	2.8	2.0
Q11	0.6	0	0	0	0	0.6	0	0	0.6	0	0	0.6	0	0	0.6
Q12	1.7	3.8	2.1	1.7	3.8	2.3	1.7	3.8	2.3	1.7	3.8	2.3	1.7	3.8	1.9
Q13	1.7	4.8	2.3	1.7	4.8	2.3	0	4.8	2.3	1.7	4.8	2.3	1.6	4.8	2.3
Q14	0.8	4.8	1.4	0.8	4.8	1.4	0.8	4.8	1.4	0.8	4.8	1.4	0.8	4.8	1.4

4.5.10 [1][3] END ALARM

■ INTEGRATED CIRCUITS

IC NO. \ MODE	SP PLAY	LP PLAY	SP REC	LP REC	STOP
IC1 ①	0	2.8	0	0	5.0
②	0	5.0	0	3.5	5.0
③	0	3.3	0	2.5	2.1
④	5.1	5.0	5.1	0	0
⑤	4.0	0	1.0	2.3	2.8
⑥	2.7	0	3.0	0	3.0
⑦	2.4	2.3	2.9	2.5	2.6
⑧	0	0	0	0	0
⑨	0	2.5	2.5	2.5	0
⑩	5.0	5.0	5.0	5.0	5.0
⑪	0	0	0	0	0
⑫	0	0	0	0	0
⑬	5.1	5.0	0	0	0
⑭	0	5.0	0	0	5.0
⑮	0	0	0	0	0
⑯	5.1	5.0	5.0	5.1	5.0
IC2 ①	0	0	5.0	5.1	5.0
②	5.1	0	5.1	5.1	5.0
③	3.4	3.0	2.7	1.6	3.6
④	1.0	3.7	0	2.5	3.3
⑤	0	5.0	4.8	0	0
⑥	2.5	0	0	5.1	0
⑦	0	0	0	0	0
⑧	5.1	0	0	5.1	5.0
⑨	5.0	5.0	5.0	5.0	0
⑩	5.1	0	5.0	3.3	0
⑪	0	0	1.5	5.1	5.0
⑫	0	0	0	0	0
⑬	5.0	5.0	5.0	5.0	5.0
⑭	5.1	5.0	5.1	5.1	5.0
IC3 ①	0	0	0	0	0
②	0	0	0	0	0
③	5.1	5.0	0	5.1	5.1
④	5.0	5.0	0	4.8	5.0
⑤	0	0	5.1	0	5.1
⑥	5.0	5.0	0	4.8	5.0
⑦	0	0	0	0	0
⑧	0	0	0	0	0
⑨	0	5.0	5.1	5.1	5.1
⑩	0	0	0	0	0
⑪	5.1	0	0	0	0
⑫	5.1	0	0	5.1	5.1
⑬	5.0	0	0	0	0
⑭	5.1	5.0	5.1	5.1	5.1
IC4 ①	0	0	0	0	0
②	2.8	2.2	2.7	2.3	2.1
③	5.1	5.0	5.0	5.1	5.1
④	3.9	1.4	4.1	1.4	3.4
⑤	4.3	0	0	3.3	4.8
⑥	0	0	0	0	0
⑦	0	0	0	0	0
⑧	0	0	0	0	0
⑨	5.1	0	5.1	0.1	2. 2
⑩	5.1	3.5	0	0.5	5. 1
⑪	0	0	5.1	0	5. 1
⑫	5.1	0	0	5.1	0
⑬	5.1	0	5.1	5.1	5. 1
⑭	5.1	5.0	5.1	5.1	5. 1

IC NO. \ MODE	SP PLAY	LP PLAY	SP REC	LP REC	STOP
IC5 ①	0	0	0	0	0
②	5.1	5.0	5.1	5.1	0
③	0	5.0	5.1	5.1	0
④	0	0	0	0	0
⑤	5.1	5.0	5.1	5.1	5.1
⑥	5.1	5.0	5.1	5.1	0
⑦	0	0	0	0	0
⑧	0	0	0	0	0
⑨	0	0	0	0	0
⑩	5.1	5.0	5.1	0	5.1
⑪	5.1	5.0	5.1	5.1	5.1
⑫	0	0	0	0	0
⑬	0	5.0	1.9	5.1	0
⑭	5.1	0	5.1	0	5.1
⑮	0	0	5.1	0	0
⑯	5.1	5.1	5.1	5.1	5.1
IC6 ①	0	0	0	0	0
②	0	0	0	0	0
③	5.1	5.0	5.1	5.1	5.1
④	0	3.3	0	5.1	5.1
⑤	0	5.0	4.2	5.1	5.1
⑥	5.1	0	5.1	0	0
⑦	0	0	0	0	0
⑧	0	0	0	0	5.1
⑨	0	5.0	0	5.1	5.1
⑩	0	0	0	0	0
⑪	5.1	5.0	0	5.1	5.1
⑫	0	0	0	0	0
⑬	0.6	0.6	4.3	1.0	0.6
⑭	5.1	5.0	5.1	5.1	5.1
IC7 ①	0	0	0	0	0
②	0	0	0	0	0
③	0	0	0	0	0
④	0	0	0	0	0
⑤	0	0	0	0	0
⑥	0	0	0	0	0
⑦	0	0	0	0	0

■ TRANSISTORS

TR NO. \ MODE	SP PLAY			LP PLAY			SP REC			LP REC			STOP		
	E	C	B	E	C	B	E	C	B	E	C	B	E	C	B
Q1	0	0	4.3	0	0	4.3	0	5.0	0.1	0	5.0	0.1	0	0	4.3
Q2	5.1	0	5.0	5.1	0	5.0	5.1	0	5.0	5.1	0	5.0	5.1	0	5.0
Q3	0	5.0	0.6	0	5.0	0.6	0	0	4.3	0	4.8	1.0	0	5.0	0.6

■ CONNECTORS

CN NO. \ MODE	SP PLAY	LP PLAY	SP REC	LP REC	STOP
CN1 ①	5.1	5.1	5.1	5.1	5.1
②	5.1	5.1	5.1	5.1	5.1
③	5.0	5.0	5.0	5.0	5.0
④	4.3	4.3	0.1	0.1	4.3
⑤	4.6	0.1	4.6	0.4	0.1
⑥	0	5.0	0	5.0	0
⑦	5.1	5.0	5.1	0	0
⑧	0	0	0	0	0

Note: Voltage at every part of [1][3] END ALARM board was measured with a digital voltmeter (DC range) with the following input signals:
1) Color bars in REC mode
2) In PB mode, playback of the alignment tapes of MH-C2 (color bars segment in SP mode) and CH-C5L (in LP mode).

4.5.11 [2][1] IMAGER (1)

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	E-E
IC1 ①	0.2	0
②	0	0
③	0	0
④	0	0
⑤	0.9	10.7
⑥	0	0
⑦	0.1	2.2
⑧	0.1	0.6
⑨	0	0
⑩	0	0
⑪	0	0
⑫	0	0.1
⑬	0	0
⑭	0	−2.5
⑮	0	0
⑯	0	0
⑰	0	0
⑱	0	−0.6
⑲	0	0
⑳	0	18.2
IC2 ①	0.2	4.9
②	0.2	3.4
③	0	0
④	0	0
⑤	0.1	0
⑥	0	0
⑦	0.1	2.7
⑧	0	0
⑨	0	2.7
IC3 ①	0	0
②	0	1.0
③	0	0
④	0	1.2
⑤	0	3.7
⑥	0	9.1
⑦	0	3.0
⑧	0	0

■ TRANSISTORS

TR NO \ MODE	STOP			E-E		
	E	C	B	E	C	B
Q1	0	0	0	18.2	18.8	18.8
Q2	0	0	0	10.1	14.9	10.7
Q3	0	0	0	10.1	4.3	10.1
Q4	0	0.2	0	0	4.2	0.1
Q5	0	0.2	0.1	2.7	4.9	3.4
Q6	0	0	0.1	0.4	3.7	1.6
Q7	0	0.2	0.2	3.0	4.9	3.6

■ CONNECTORS

CN NO. \ MODE	STOP	E-E
CN-11 ①	0	−8.0
②	0	15.1
③	0	9.0
④	0.2	5.0
⑤	0	19.6
⑥	0	
CN-12 ①	0	2.4
②	0	0

4.5.12 [2][2] IMAGER (2)

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	E-E
IC4 ①	0	−4.3
②	0	−0.1
③	0	0
④	0	0
⑤	0	−6.8
⑥	0.2	5.0
⑦	0	0
⑧	0	0
⑨	0	0
⑩	0	0
⑪	0	4.8
⑫	0	5.0
⑬	0	0
⑭	0	0
⑮	0	0
⑯	0	12.1
⑰	0	0
⑱	0	0
⑲	0	0
⑳	0	−6.8
IC5 ①	0.2	4.6
②	0.2	0
③	0.2	0
④	0.2	2.0
⑤	0.1	4.7
⑥	0.1	0
⑦	0.1	4.7
⑧	0.1	0
⑨	0.1	0
⑩	0	0
⑪	0.1	0
⑫	0	0
⑬	0.1	4.9
⑭	0	0
⑮	0	0
⑯	0	0
⑰	0	0
⑱	0	0
⑲	0	2.5
⑳	0.1	0
㉑	0	1.4
㉒	0.1	2.0
㉓	0.1	0
㉔	0	1.6
㉕	0	0
㉖	0	0
㉗	0	0
㉘	0.2	5.0
㉙	0	0
㉚	0.1	2.2
㉛	0	0
㉜	0	4.5
㉝	0.1	0.5
㉞	0	2.0
㉟	0	0
㊱	0	2.5
㊲	0	0
㊳	0	0

IC NO. \ MODE	STOP	E-E
IC5 ㊴	0.2	5.0
㊵	0.2	5.0
㊶	0.1	0
㊷	0.1	0
㊸	0.1	0
㊹	0.1	0
IC7 ①	0.2	1.7
②	0.2	0
③	0	2.5
④	0.1	2.0
⑤	0.1	2.3
⑥	0	2.5
⑦	0	0
⑧	0	4.9
⑨	0	0
⑩	0	4.9
⑪	0	0
⑫	0.1	2.4
⑬	0.1	1.7
⑭	0.2	5.0
IC8 ①	0.1	1.7
②	0.2	1.7
③	0	1.8
④	0.1	1.7
⑤	0.1	1.7
⑥	0.2	3.2
⑦	0	0
⑧	0.2	0.1
⑨	0.2	1.6
⑩	0.2	1.6
⑪	0.1	0.1
⑫	0.1	1.6
⑬	0.1	1.6
⑭	0.2	5.0

■ TRANSISTORS

TR NO. \ MODE	STOP			E-E		
	E	C	B	E	C	B
Q8	0	0	0	−7.2	−8.0	−7.8
Q9	0	0	0	12.1	14.9	12.7
Q11	0	0	0	−7.8	−7.2	−7.2

Note: Voltage at every part of [2][1] IMAGER (1), [2][2] IMAGER (2), [2][3] VIDEO, [2][4] E-E & IND, [2][6] CONTROL, [2][7] PAL SUB boards was measured with a digital voltmeter (DC range) with input signals supplied from a camera picking up the gray scale pattern.

■ CONNECTORS

MODE / CN NO.	STOP	E-E
CN-13 ①	0	0
②	0	0
③	0	0
④	0	0
⑤	0	4.5
⑥	0	5.0
⑦	0	4.8
⑧	0	0
⑨	0	0
⑩	0	4.8
⑪	0	0
⑫	0	0
CN-14 ①	0	2.5
②	0	0
③	0	2.5
④	0	0

4.5.13 [2] [3] VIDEO

■ INTEGRATED CIRCUITS

MODE / IC NO.	STOP	E-E
IC1 ①	0	0
②	0.1	0
③	0.1	0
④	0.1	0
⑤	0	0
⑥	0	0
⑦	0.1	0
⑧	0.1	0
⑨	0	0
⑩	0.1	0
⑪	0.1	0.3
⑫	0.1	0
⑬	0.1	0
⑭	0	0
⑮	0.1	0
⑯	0.1	0
⑰	0	0
⑱	0.1	0
⑲	0.1	0
⑳	0	0
㉑	0	0
㉒	0.4	0
㉓	0.2	0
㉔	0.2	0
㉕	0	0
㉖	0	0
㉗	0	0
㉘	0.1	0
㉙	0	0
㉚	0	0
㉛	0	0
㉜	0	0
㉝	0	0
㉞	0	0
㉟	0.1	0
㊱	0.1	0
㊲	0	0
㊳	0	0
㊴	0.2	0
㊵	0	0
㊶	0.1	0
㊷	0	0
㊸	0	0
㊹	0.1	0

MODE / IC NO.	STOP	E-E
IC2 ①	0	4.9
②	0	2.5
③	0	2.6
④	0	5.0
⑤	0	2.4
⑥	0	2.4
⑦	0	0
⑧	0	0.1
⑨	0	5.0
⑩	0	4.9
⑪	0	0
⑫	0	0
⑬	0	4.9
⑭	0	4.9
IC3 ①	0.4	1.6
②	0	0
③	0	0.9
④	0	2.9
⑤	0	4.9
⑥	0.4	2.8
⑦	0	0
⑧	0	0
⑨	0.6	1.2
⑩	0	0
⑪	0	0
⑫	0	0
⑬	0	0
⑭	0	0
⑮	0	0
⑯	0	0
⑰	0	0
⑱	0	0
⑲	0	0
⑳	0	0
㉑	0	0
㉒	0	0
㉓	0	0
㉔	0	2.5

MODE / IC NO.	STOP	E-E
IC5 ①	0	9.0
②	0	1.6
③	0	4.7
④	0	0
⑤	0	0
⑥	0	0.1
⑦	0	3.1
IC6 ①	0	0
②	0	0
③	0	1.7
④	0.8	2.4
⑤	0.3	2.2
⑥	0	1.9
⑦	0	1.9
⑧	0	0
⑨	0.9	2.7
⑩	0	0
⑪	0	2.0
⑫	0	0
⑬	0	2.0
⑭	0	2.0
⑮	0	2.0
⑯	0	2.1
⑰	0	2.4
⑱	0	2.0
⑲	0	2.1
⑳	0	4.9
㉑	0	0.1
㉒	0	0.4
㉓	0	2.8
㉔	0	2.2
㉕	0	2.1
㉖	0	2.5
㉗	0.4	2.9
㉘	0	2.5
㉙	0	0
㉚	0	0
㉛	0	0
㉜	0	0

MODE / IC NO.	STOP	E-E
IC6 ㉝	0	4.9
㉞	0	1.7
㉟	0	2.1
㊱	0	1.8
㊲	0	3.3
㊳	0	3.1
㊴	0	1.9
㊵	0	1.8
㊶	0	0
㊷	0	1.8
㊸	0	1.8
㊹	0	1.8
IC7 ①	0	2.6
②	0	1.4
③	0	2.1
④	0.8	2.6
⑤	0	3.0
⑥	0	0
⑦	0	3.0
⑧	0.5	2.7
⑨	0	3.8
⑩	0	2.4
⑪	0	2.2
⑫	0	9.0
⑬	0	2.9
⑭	0	4.9
⑮	0	1.4
⑯	0	3.4
⑰	0	0.9
⑱	0	4.1
⑲	0	3.5
⑳	0	0.7
㉑	0	4.6
㉒	0	2.7
㉓	0	1.4
㉔	0	2.2
㉕	0	2.2
㉖	0	2.5

■ TRANSISTORS

MODE / TR NO.	STOP			E-E		
	E	C	B	E	C	B
Q1	0	0	0	2.1	5.0	2.4
Q2	0	0	0	2.1	5.0	2.4
Q3	0	0	0	2.4	4.9	2.4
Q4	0	0	0	1.5	3.8	1.8
Q5	0	0	0	3.7	4.9	3.8
Q6	0	0	0	3.1	4.9	3.6
Q7	0	0	0	1.3	0	0.6
Q8	0	0	0	1.3	0.3	0.7
Q9	0	0	0	1.9	1.3	0
Q10	0	0	0	1.3	0	0.7
Q11	0	0	0	2.4	4.9	3.0
Q12	0	0	0	1.4	4.9	2.2
Q13	0	0	0	1.0	4.0	0.5
Q14	0	0	0	1.7	0	1.0
Q15	0	0	0	2.3	4.9	3.0
Q16	0	0	0	1.5	4.9	2.2
Q17	0	0	0	1.5	4.1	2.2
Q18	0	0	0	3.4	4.9	4.0
Q19	0	0	0	1.3	4.9	2.0
Q20	0	0	0	2.5	4.9	3.2
Q21	0	0	0	2.6	4.9	3.2
Q22	0	0	0	1.6	4.9	2.2
Q23	–	–	–	–	–	–
Q24	0	0	0	0.2	0.1	0.2
Q25	0	0	0	1.2	1.2	3.6

■ CONNECTORS

CN No. \ MODE	STOP	E-E
CN-V1 ①	0	0
②	0	0
③	0	4.8
④	0	0
⑤	0	0
⑥	0	4.8
⑦	0	5.0
⑧	0	4.5
⑨	0	0.5
⑩	0	0
⑪	0	2.7
⑫	0	0
CN-V2 ①	0	0
②	0	2.5
③	0	0
④	0	2.2
CN-V3 ①	0	0
②	0	2.9

CN No. \ MODE	STOP	E-E
CN-V4 ①	0	0.5
②	0	0
③	0	0
④	0	4.5
⑤	7.6	7.5
⑥	0	0
⑦	0	0
⑧	0	1.2
⑨	0.4	3.4
⑩	0.6	1.1
CN-V5 ①	0	0
②	0	2.1
③	0	2.1
④	0	0
CN-V6 ①	0	3.6
②	0	3.4
③	0	9.0
④	2.4	2.2
⑤	0	5.0
⑥	0	3.4
⑦	0	1.9
⑧	0	1.9
⑨	2.7	2.7
⑩	0	0

4.5.14 2 4 E-E & IND

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	E-E
IC1 ①	0	0
②	0	0
③	0.9	4.6
④	0	4.8
⑤	0	4.5
⑥	0	4.5
⑦	4.6	2.6
⑧	4.6	2.7
⑨	4.6	4.2
⑩	4.6	3.5
⑪	4.6	4.2
⑫	0	0
⑬	4.6	4.3
⑭	0	0
⑮	1.1	4.7
⑯	0	0
⑰	4.6	4.3
⑱	0	0
⑲	0	4.8
⑳	0	0
㉑	0	0
㉒	0.9	4.3
㉓	4.6	4.2
㉔	4.6	4.2
㉕	4.6	4.2
㉖	4.6	4.3
㉗	4.6	4.2
㉘	0	0
㉙	0	0
㉚	0	0
㉛	0	0
㉜	0	0
㉝	3.7	3.7
㉞	0	0
㉟	4.1	4.1
㊱	0	0
㊲	0	0
㊳	5.1	0
㊴	5.0	5.1

IC NO. \ MODE	STOP	E-E
IC1 ㊵	5.1	5.1
㊶	0	0
㊷	0	4.9
㊸	0	0
㊹	0	0
IC2 ①	0	0
②	0	3.1
③	0.1	2.2
④	0	2.6
⑤	0.2	3.1
⑥	0.2	1.0
⑦	0	0
⑧	0	2.6
⑨	0	2.7
⑩	0	2.7
⑪	0	0
⑫	0	2.6
⑬	0	4.9
⑭	0	2.6
⑮	0	3.1
⑯	0	0
⑰	0	2.9
⑱	0	2.3
⑲	0	0
⑳	0	2.5
㉑	0	3.4
㉒	0	3.6
㉓	0	0
㉔	0	3.2
㉕	0	0.6
㉖	0	2.9
㉗	0	0
㉘	0	2.4
IC3 ①	6.8	6.7
②	0.6	1.1
③	1.6	1.6

IC NO. \ MODE	STOP	E-E
IC3 ④	8.0	8.0
⑤	0	2.5
⑥	0	2.6
⑦	0	0.6
⑧	1.7	4.3
⑨	0	2.9
⑩	0	2.9
⑪	0	0
⑫	4.0	4.0
⑬	4.0	4.0
⑭	6.2	3.5
IC4 ①	4.8	4.8
②	0	0
③	0	0
④	0	0
⑤	0	0
⑥	0	0
⑦	0	0
⑧	0	0
		0

IC NO. \ MODE	STOP	E-E
IC5 ①	0	0.5
②	0	4.5
③	0	0
④	0	4.8
⑤	0	1.2
⑥	0	3.8
⑦	0	0
⑧	0	0
⑨	0.9	5.0
⑩	0	4.9
⑪	0	0
⑫	0	5.0
⑬	0	0
⑭	0	5.0
IC6 ①	10.1	10.0
②	0	0
③	5.1	5.0

■ TRANSISTORS

TR NO. \ MODE	STOP			E-E		
	E	C	B	E	C	B
Q1	4.6	4.6	0	4.3	4.6	5.0
Q2	—	—	—	—	—	—
Q3	0	0	0	1.9	1.6	1.8
Q4	0	0	0	1.2	4.9	1.9
Q5	0	0	0	0	0	0.5
Q6	0	7.6	0.8	0	7.7	1.9
Q7	0	0	0	1.4	3.7	1.9
Q8	0	0	0	3.2	4.9	3.6
Q9	0	0	0	1.6	4.9	2.2
Q10	0	0	0	2.2	4.9	2.9
Q11	0	0	0	5.0	2.7	1.7
Q12	0	0	0	2.7	0	2.1
Q13	0	0	0	1.9	2.1	0

■ CONNECTORS

CN No. \ MODE	STOP	E-E
CN-E2 ①	0	0
②	0	2.5
③	0	2.5
④	0	0
CN-E3 ①	0	4.0
②	0	3.5
③	0	9.0
④	2.4	2.2
⑤	0.2	5.0
⑥	0	3.4
⑦	0.1	0
⑧	0	0
⑨	2.8	2.6
⑩	0	0

CN No. \ MODE	STOP	E-E
CN-E4 ①	0	0
②	0	0
③	0	0
④	0	4.5
⑤	7.6	0
⑥	0	0
⑦	0	0
⑧	0	3.4
⑨	0.5	0
⑩	0.6	1.2
CN-E5 ①	5.1	1.3
②	0	0
③	8.0	8.0
④	0	5.0
⑤	0	0
⑥	0	0
⑦	0	0

CN No. \ MODE	STOP	E-E
CN-E6 ①	1.1	5.1
②	5.1	5.0
③	5.1	0
④	5.1	5.1
⑤	10.1	10.0
⑥	0	0
CN-E10 ①	0.2	2.8
②	1.7	4.5
③	0.2	2.8
④	6.3	3.7
CN-E11 ①	0	0
②	0	0
CN-E12 ①	0	0
②	0	0
③	0	0

CN No. \ MODE	STOP	E-E
CN-E13 ①	0	0
②	0	4.9
③	10.1	9.8
CN-E14 ①	0	0
②	0	5.0
③	8.0	8.0
④	10.4	10.2
⑤	0	9.0
⑥	0	0
⑦	7.9	7.8
⑧	1.1	4.9
CN-E15 ①	0	4.9
②	0	0

4.5.15 2 6 CONTROL

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	E-E
IC701 ①	0.6	3.4
②	0.3	1.5
③	0.3	1.7
④	0.3	1.6
⑤	0.3	3.5
⑥	0.5	1.8
⑦	0	0
⑧	0	1.4
⑨	0	1.6
⑩	0.6	0
⑪	0.7	0.5
⑫	1.4	1.3
⑬	2.1	0
⑭	1.5	1.4
⑮	2.1	1.7
⑯	2.7	2.7
⑰	2.9	2.8
⑱	4.3	1.6
⑲	5.1	5.1
⑳	7.9	7.8
㉑	4.9	4.9
㉒	4.8	4.8
㉓	2.6	2.3
㉔	2.4	2.1
㉕	1.8	1.8
㉖	0	0
㉗	0	0
㉘	0.9	5.0
㉙	1.6	1.6
㉚	0	3.1
㉛	0	0
㉜	0	3.0
㉝	0	3.0
㉞	−0.1	3.0
㉟	0	6.9
㊱	0	3.0
㊲	0	0
㊳	0	0
㊴	0	0
㊵	0	4.9
㊶	0	5.0
㊷	0	5.0
㊸	0	0.9
㊹	−0.1	0.7
㊺	0	1.6
㊻	0	3.3
㊼	0.4	2.1
㊽	0.3	2.0

■ TRANSISTORS

TR NO. \ MODE	STOP			E-E		
	E	C	B	E	C	B
Q701	0	0	0	1.5	7.2	2.1
Q702	0	0	0	8.3	9.0	9.0

■ CONNECTORS

CN NO. \ MODE	STOP	E-E
CN-C1 ①	4.5	4.2
②	4.5	4.2
③	4.5	4.2
④	4.5	4.2
⑤	0	1.8
⑥	0	0
⑦	0	0
⑧	0	5.0
⑨	0	0
⑩	0.9	5.0
⑪	0	9.0
⑫	7.9	7.8
⑬	0	5.0
⑭	2.7	2.8
⑮	2.4	2.1
CN-C3 ①	0	0
②	0	0
③	0	6.9

4.5.16 2 8 REGULATOR

■ INTEGRATED CIRCUITS

IC NO. \ MODE	STOP	E-E
IC1 ①	9.1	8.7
②	0	0
③	1.2	1.2
IC2 ①	0	−8.0
②	0	0
③	0	−9.6

■ TRANSISTOR

TR. NO. \ MODE	STOP			E-E		
	E	C	B	E	C	B
Q1	10.1	9.4	8.0	9.7	9.0	9.0

■ CONNECTORS

MODE / CN NO.	STOP	E-E
CN-R1 ①	0	19.6
②	0	0
③	0	15.1
④	0	9.1
⑤	0	0
⑥	−0.4	−9.7
CN-R2 ①	0	−8.0
②	0	15.1
③	0	9.0
④	0.2	5.0
⑤	0	19.6
⑥	0	0
CN-R3 ①	0	4.9
②	0.2	7.8
③	0	0
④	0	9.0
⑤	0	0
⑥	0	8.0
⑦	8.0	0
⑧	1.0	0

4.5.17 [2][9] PAL SUB

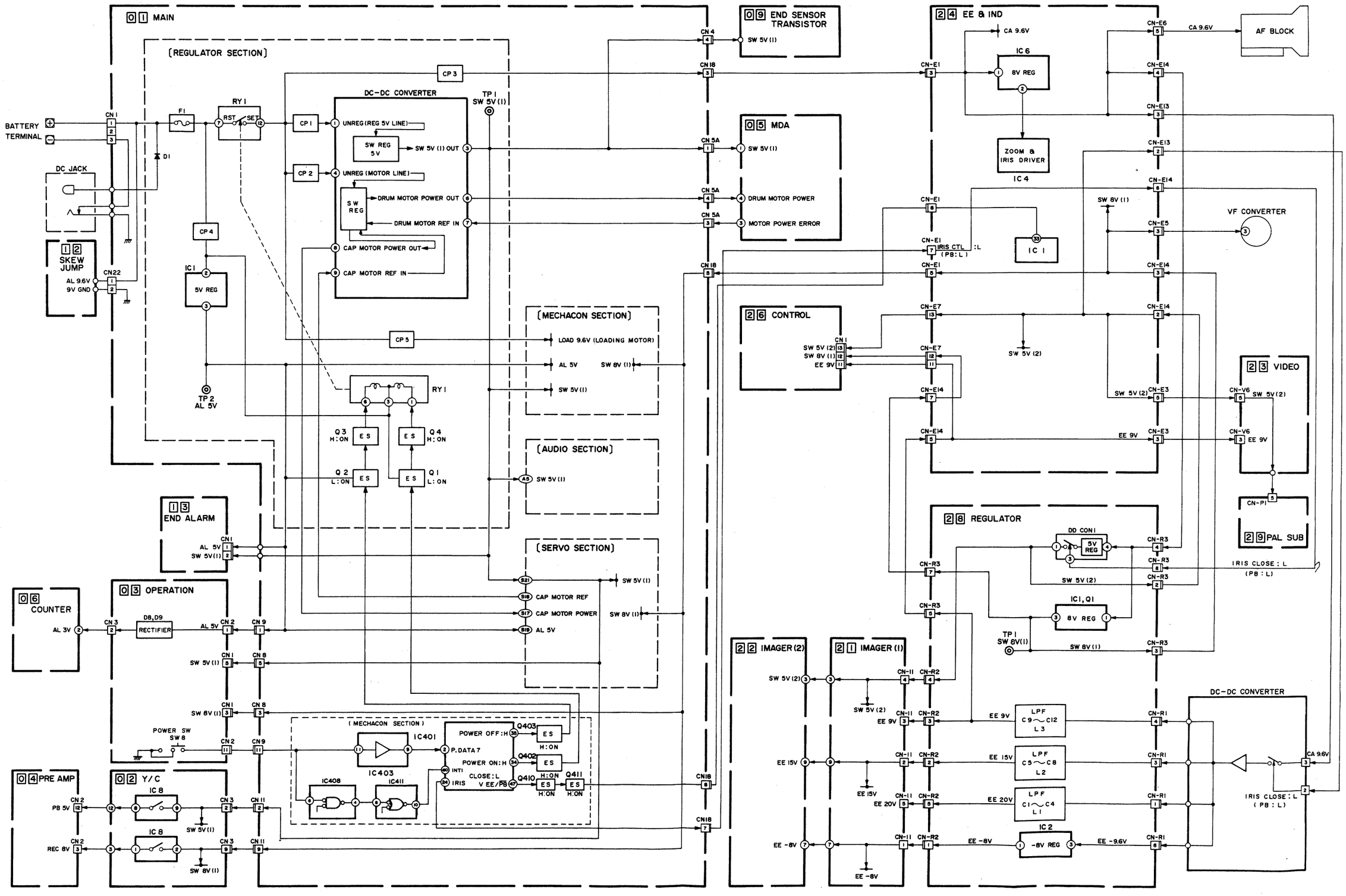
■ TRANSISTOR

MODE / TR NO.	STOP					E-E				
	E1	E2	C1	C2	B	E1	E2	C1	C2	B
Q1024	0.1	0	0	0	0	3.2	3.1	2.6	0	2.6

■ CONNECTOR

MODE / CN NO.	STOP	E-E
CN-P1 ①	0	3.1
②	0	0
③	0	0
④	0	0
⑤	0.2	4.9
⑥	0	0

4.6 POWER SYSTEM BLOCK DIAGRAM



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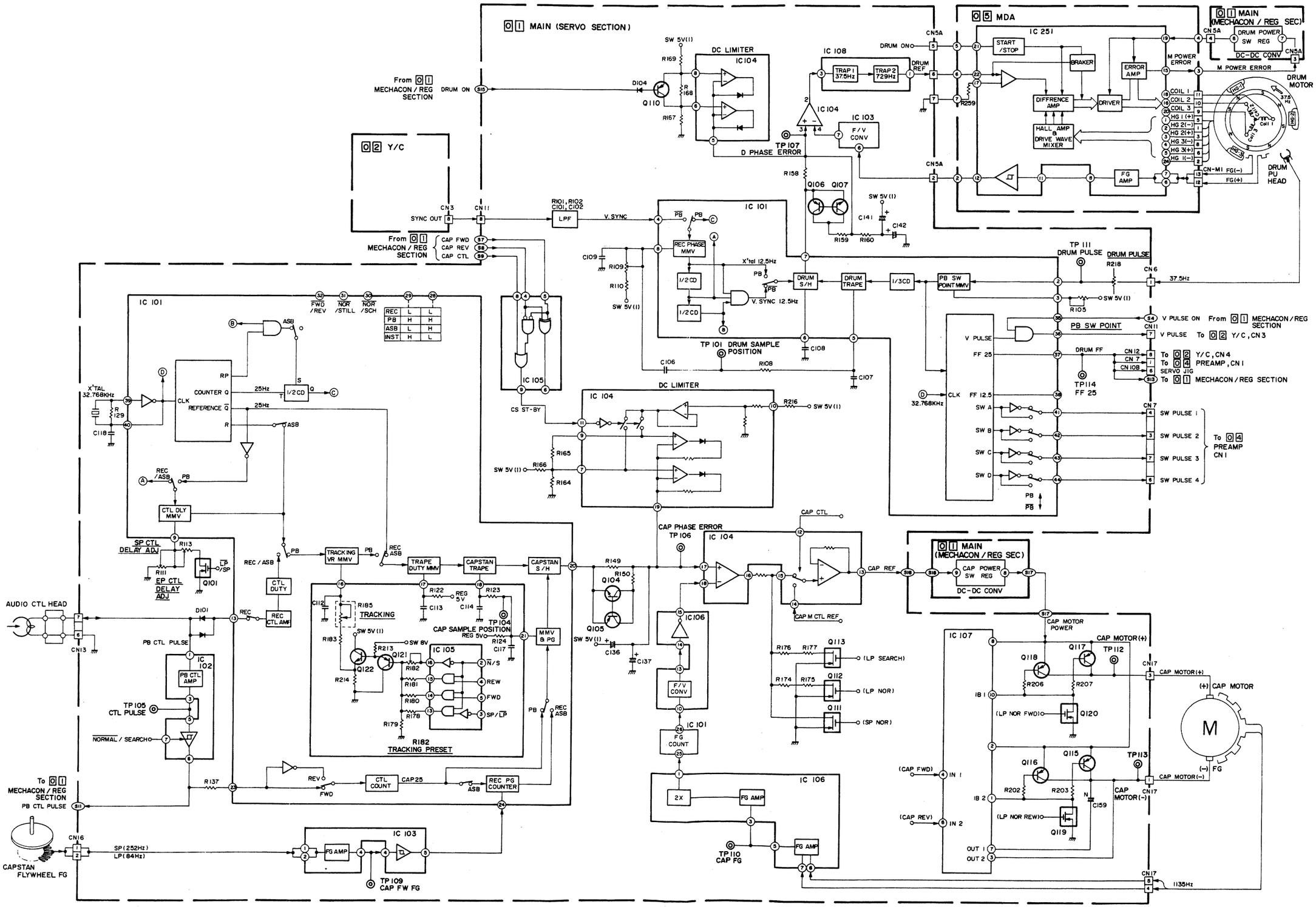
4.7 SERVO & MDA BLOCK DIAGRAMS



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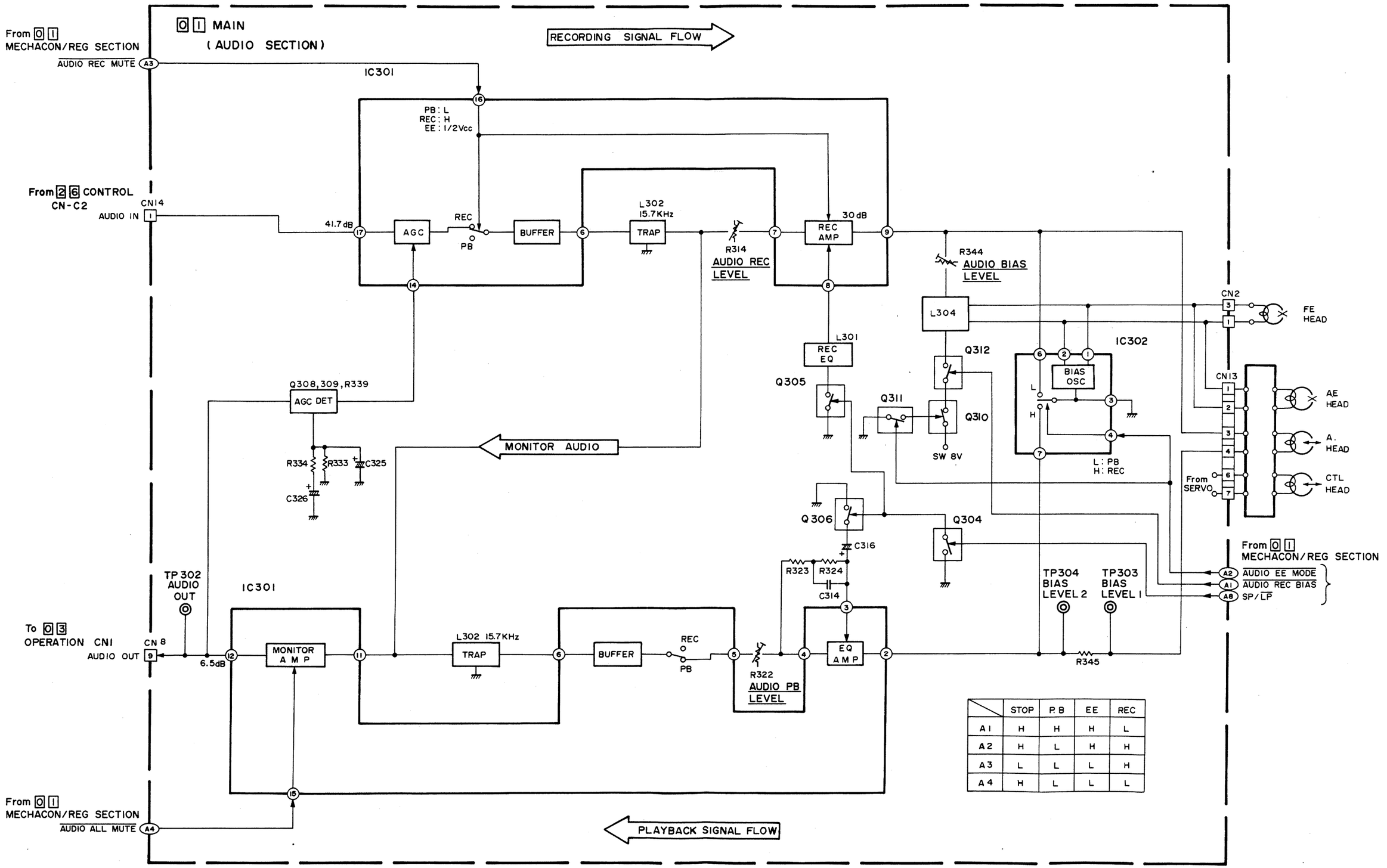
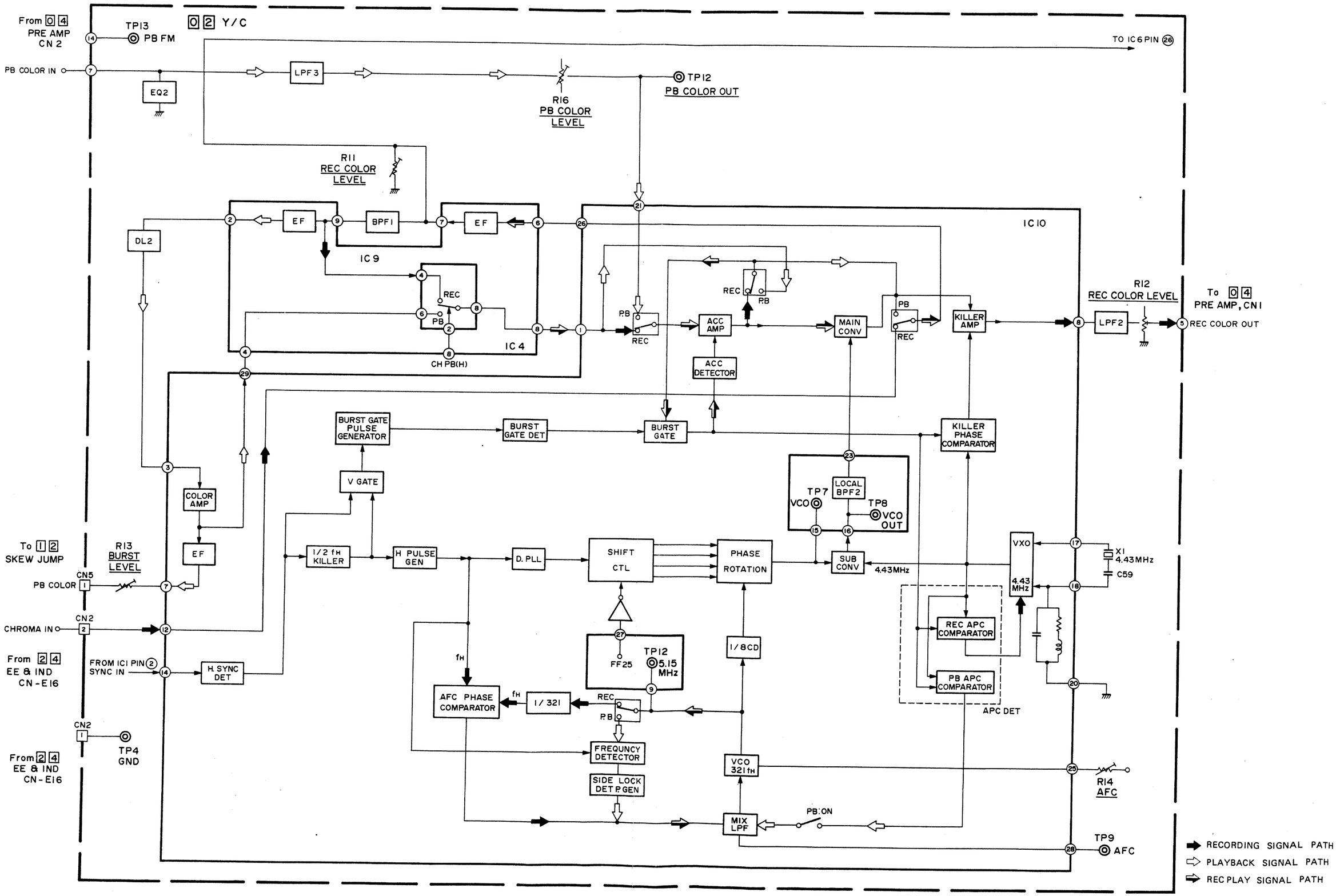
4.8 AUDIO BLOCK DIAGRAM



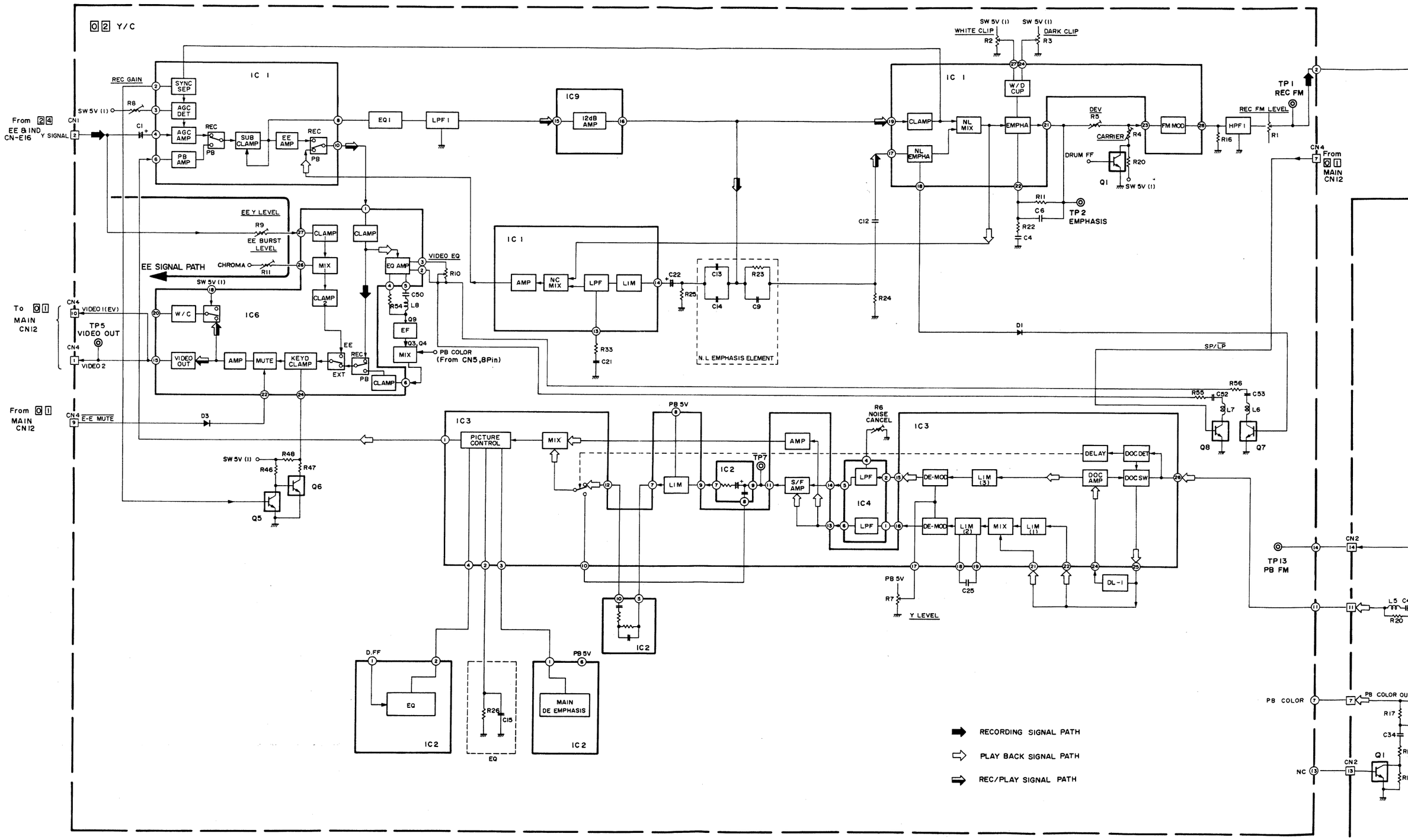
	STOP	P.B	EE	REC
A1	H	H	H	L
A2	H	L	H	H
A3	L	L	L	H
A4	H	L	L	L

4.9 Y/C BLOCK DIAGRAM

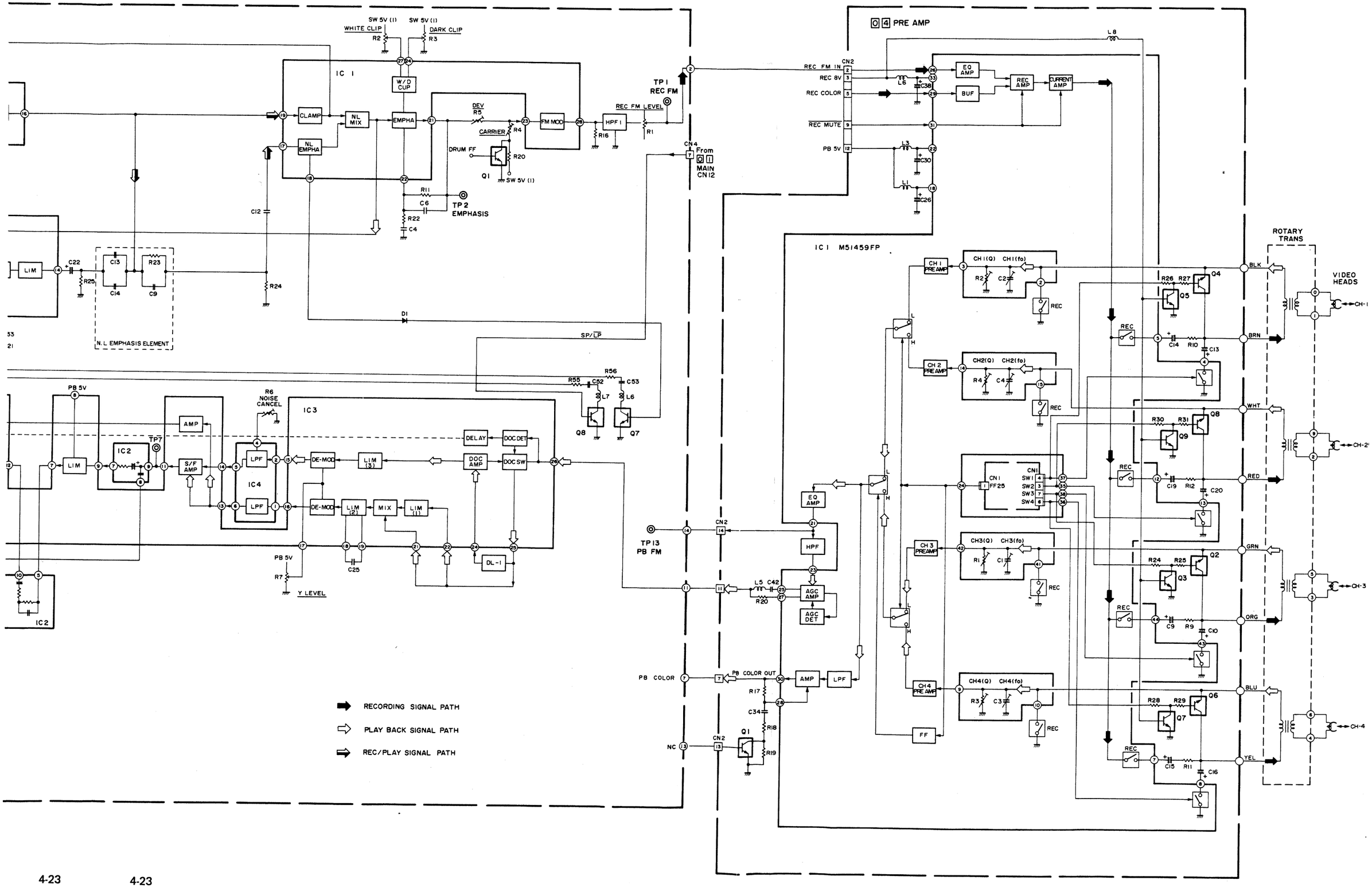


4-22

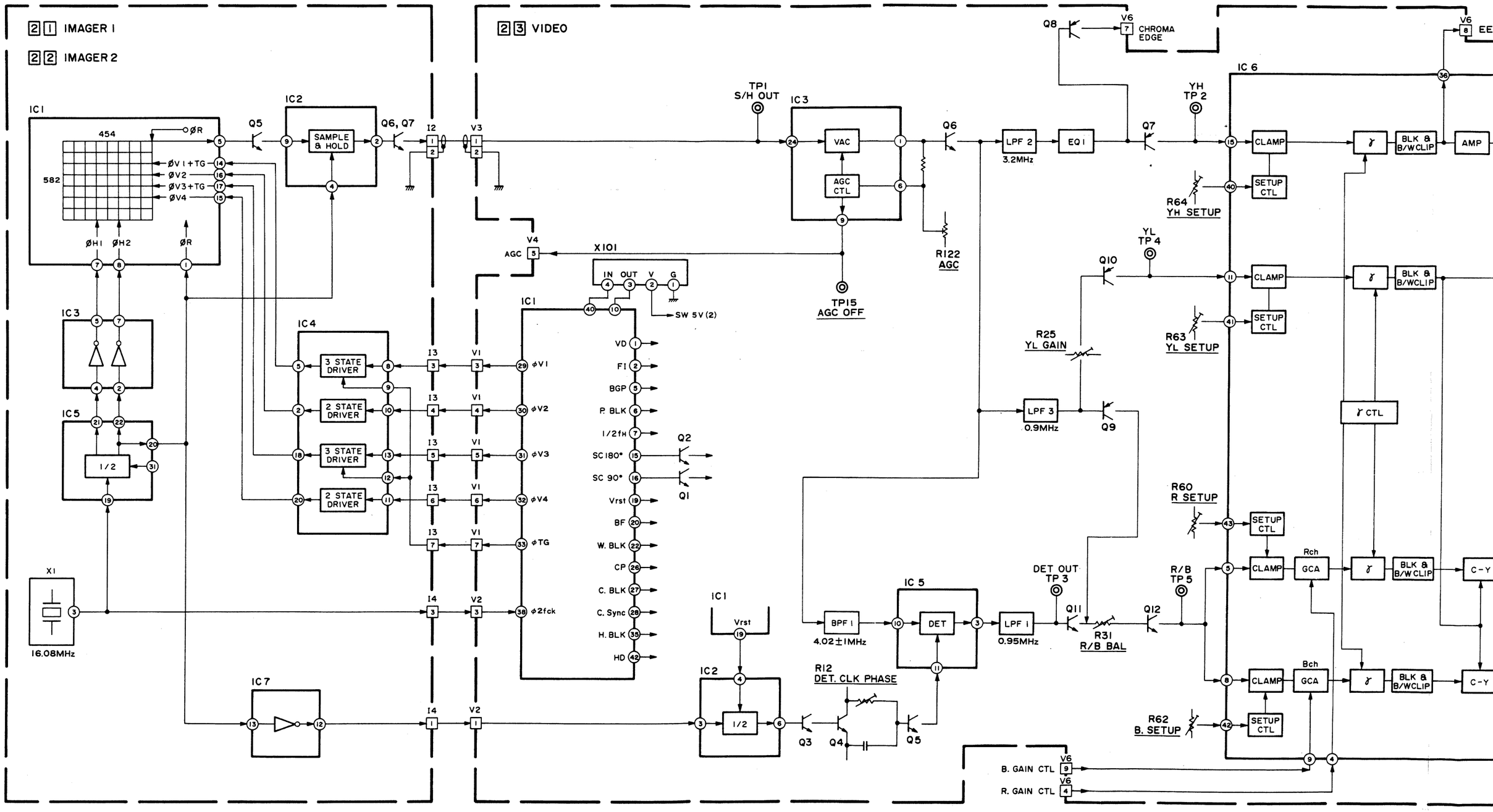
4.10 Y/C & PRE AMP BLOCK DIAGRAMS



4-23

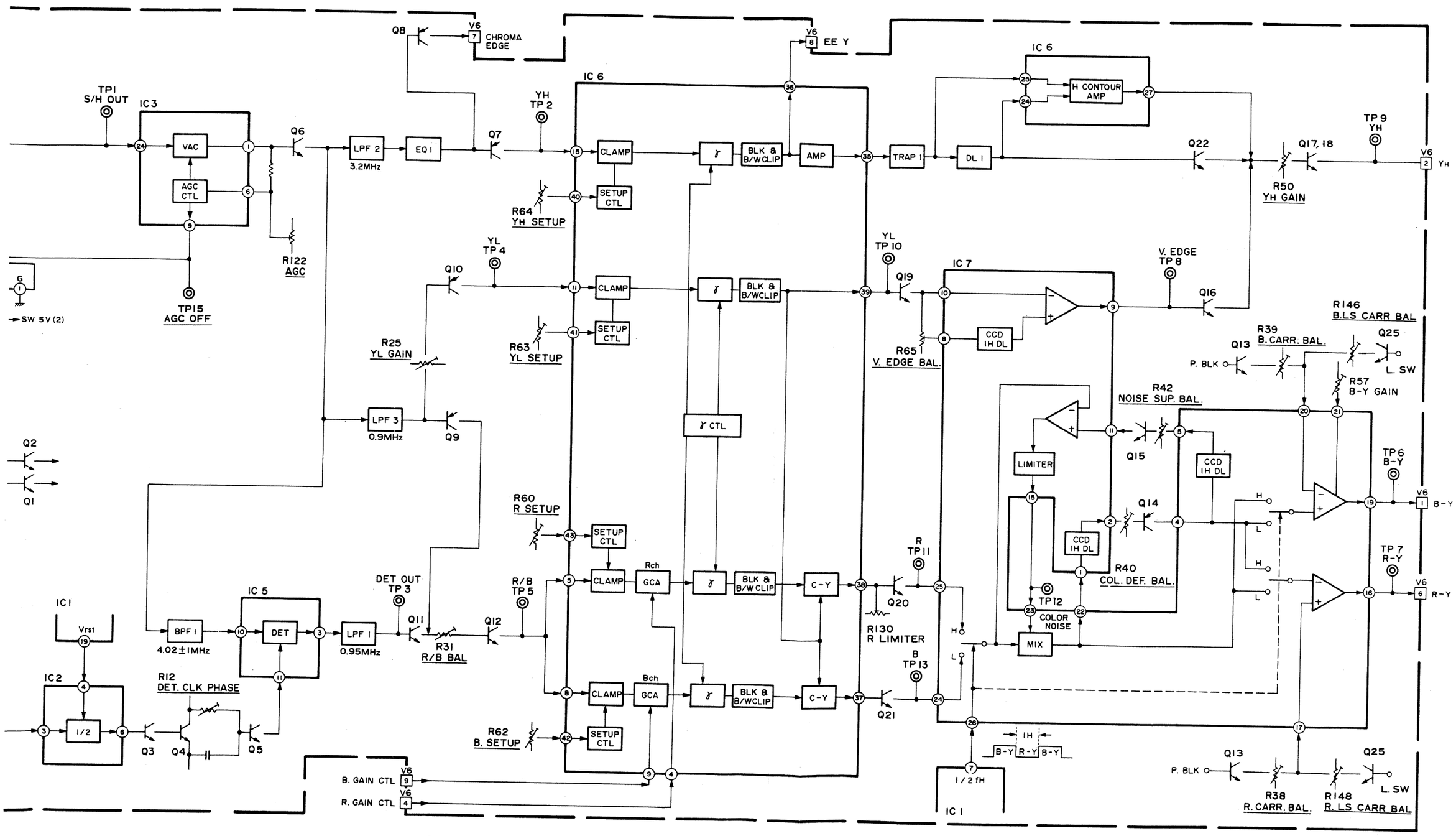

04 PRE AMP
IC1 M51459FP
IC1
IC2
IC3
IC4
SW 5V (1)
WHITE CLIP
DARK CLIP
R2
R3
W/D CUP
CLAMP
NL MIX
EMPHA
NL EMPHA
DEV R5
CARRIER
R4
FM MOD
HPF 1
REC FM LEVEL
R16
R1
TP1 REC FM
CN4
From Q1 MAIN CN12
DRUM FF
Q1
R20
R11
C6
TP2 EMPHASIS
C12
R22
C4
LIM
C22
R25
C13
C14
R23
C9
R24
N.L EMPHASIS ELEMENT
D1
SP/LP
R56
R55
C52
C53
L7
L6
Q8
Q7
PB 5V
R6 NOISE CANCEL
AMP
TP7
LIM
S/F AMP
LPF
DE-MOD
LIM (3)
DOC AMP
DOC SW
DELAY
DOC DET
LIM (2)
MIX
LIM (1)
DL-1
C25
R7
Y LEVEL
REC FM IN
REC 8V
REC COLOR
REC MUTE
PB 5V
CN2
L6
C38
L3
C30
L1
C26
L8
EQ AMP
BUF
REC AMP
CURRENT AMP
CH1 PRE AMP
CH1(Q) CH1(fo)
R2
C2
REC
CH2 PRE AMP
CH2(Q) CH2(fo)
R4
C4
CH3 PRE AMP
CH3(Q) CH3(fo)
R1
C1
CH4 PRE AMP
CH4(Q) CH4(fo)
R3
C3
CN1
FF25
SW1
SW2
SW3
SW4
FF
L
H
ROTARY TRANS
VIDEO HEADS
BLK
BRN
WHT
RED
GRN
ORG
BLU
YEL
R26
R27
Q4
Q5
C14
R10
C13
R30
R31
Q8
Q9
C19
R12
C20
R24
R25
Q2
Q3
C9
R9
C10
R28
R29
Q6
Q7
C15
R11
C16
CH-1
CH-2
CH-3
CH-4
TP13 PB FM
EQ AMP
HPF
AGC AMP
AGC DET
L5
C42
R20
PB COLOR
PB COLOR OUT
AMP
LPF
R17
C34
R18
R19
NC
RECORDING SIGNAL PATH
PLAY BACK SIGNAL PATH
REC/PLAY SIGNAL PATH

4.11 IMAGER (1), (2) & VIDEO BLOCK DIAGRAMS



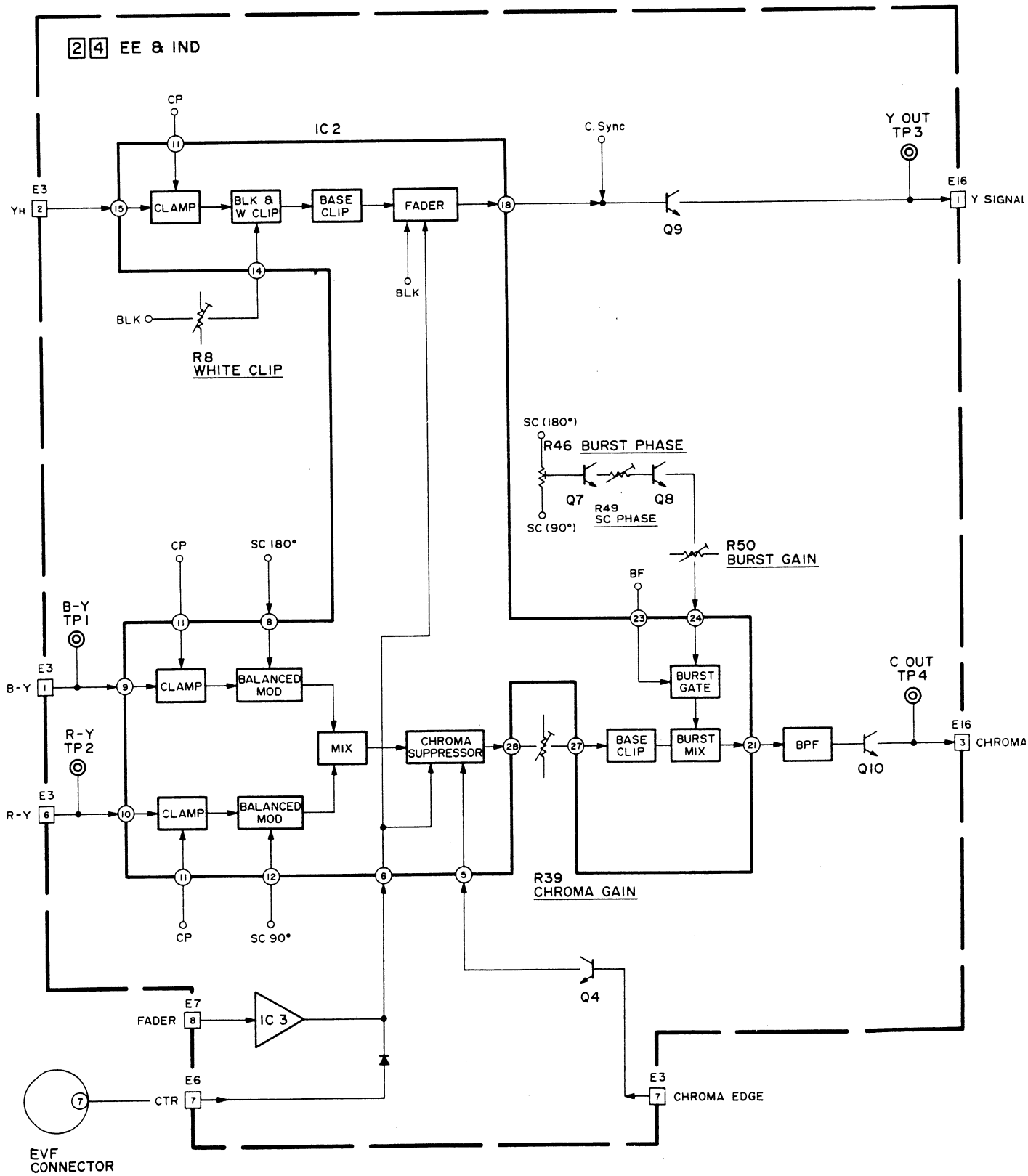
4-24

4-24


TP1
S/H OUT
IC3
VAC
AGC CTL
R122
AGC
TP15
AGC OFF
SW 5V (2)
Q6
LPF 2
3.2MHz
EQ 1
Q7
Q8
V6
7
CHROMA EDGE
V6
8
EE Y
IC 6
YH
TP 2
CLAMP
SETUP CTL
R64
YH SETUP
γ
BLK & B/W CLIP
AMP
TRAP 1
DL 1
H CONTOUR AMP
Q22
Q17, 18
R50
YH GAIN
TP 9
YH
V6
2
YH
YL
TP 4
Q10
R25
YL GAIN
R63
YL SETUP
YL
TP 10
Q19
IC 7
CCD 1H DL
R65
V. EDGE BAL.
V. EDGE
TP 8
Q16
R146
B.LS CARR BAL
R39
B. CARR. BAL.
Q13
P. BLK
Q25
L. SW
R57
B-Y GAIN
R42
NOISE SUP. BAL.
Q15
LIMITER
CCD 1H DL
TP6
B-Y
V6
1
B-Y
Q14
R40
COL. DEF. BAL.
TP12
COLOR NOISE
MIX
TP 7
R-Y
V6
6
R-Y
R
TP11
Q20
R130
R LIMITER
B
TP13
Q21
H
L
1H
B-Y R-Y B-Y
1/2fH
IC 1
LPF 3
0.9MHz
Q9
Q2
Q1
R60
R SETUP
R62
B. SETUP
Rch
Bch
GCA
C-Y
γ CTL
IC1
Vrst
IC2
1/2
R12
DET. CLK PHASE
Q3
Q4
Q5
IC 5
BPF 1
4.02±1MHz
DET
LPF 1
0.95MHz
DET OUT
TP 3
Q11
R31
R/B BAL
Q12
R/B
TP5
B. GAIN CTL
R. GAIN CTL
R38
R. CARR. BAL.
R148
R. LS CARR BAL

4-24

4.12 EE & IND BLOCK DIAGRAM



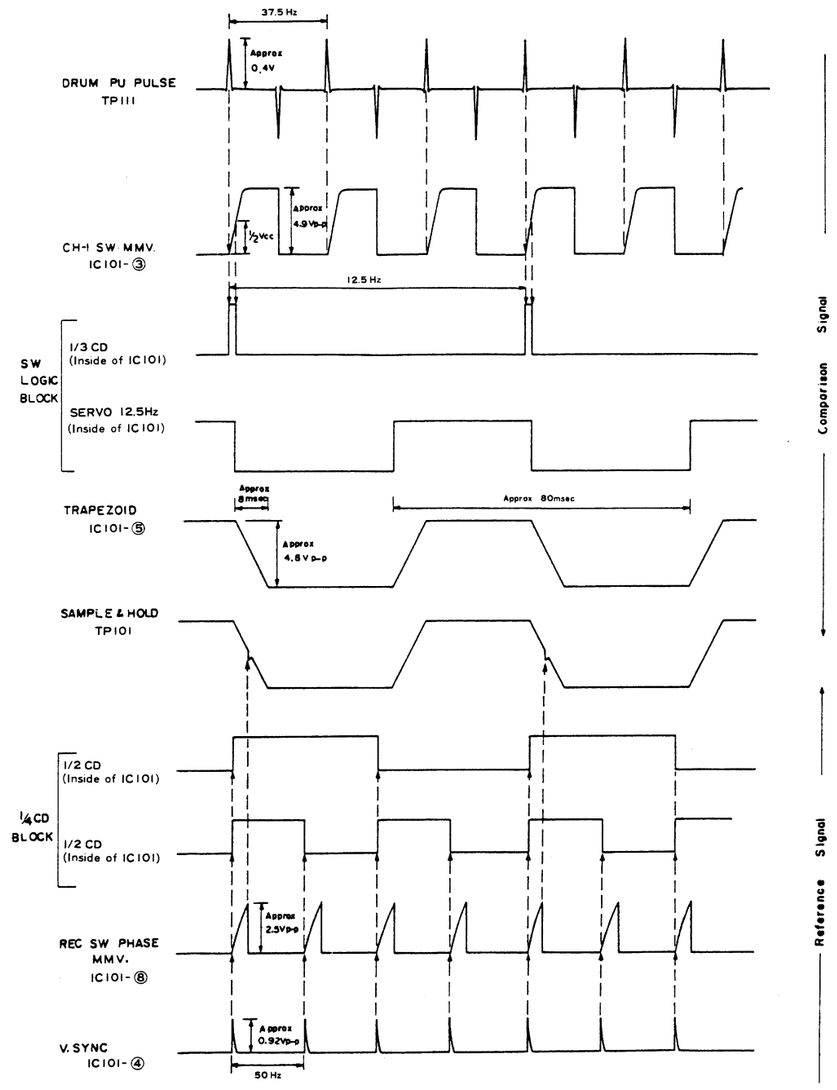
4.13 [2][4] EE & IND IC1 SPECIFICATIONS

PIN NO.	SYMBOL	NAME	IN/OUT	DESCRIPTION
1	TEND	TAPE END	IN	TAPE END : H
2	REC	SP RECORDING	IN	SP MODE RECORDING : L
3	LP REC	LP RECORDING	IN	LP MODE RECORDING : L SP MODE : H
4	$\overline{VD}$	V SYNC INPUT	IN	V SYNC SIGNAL INPUT TERMINAL
5	$\overline{HD}$	H SYNC INPUT	IN	H SYNC SIGNAL INPUT TERMINAL
6	VSS	GND		GND
7	OSC 1	CRYSTAL OSCILLATION		CR OSCILLATION TERMINAL (5.36 MHz)
8	OSC 2			
9	$\overline{TST\ 1}$	TEST MODE SHIFT		TEST MODE SHIFT TERMINAL
10	$\overline{TST\ 2}$			OPIN-IN USE
11	TRIG	TRIGGER INPUT	IN	TRIGGER INPUT TERMINLA
12	NC	–		NO CONNECT
13	SIS Q	TOGGLE OUTPUT	OUT	REC START/STOP INVERSION OUTPUT
14	SIS $\overline{Q}$			TO OUTPUT INVERSION STORED DATA BY TRIGGER SIGNAL
15	AF OUT	AUTO FOCUS OUT	OUT	AUTO FOCUS : H PLAY BACK : L
16	QFA	QUICK FADER	OUT	FADER IN : H FADER OUT : L
17	VDD	POWER SOURCE	IN	+5 V POWER SOURCE TERMINAL
18	FAD	FADER (1)	OUT	FADER IN : H FADER OUT : L
19	FC OUT	FILTER CHANGE OUT	OUT	IN DOOR : L OUT DOOR : H
20	STD OUT	STANDERD OUT	OUT	FULL AUTO WHITE : L STANDERD : H
21	NC	–		NO CONNECT
22	VCC	POWER SOURCE	IN	+5 V POWER SOURCE TERMINAL
23	FILTC	FILTER CHANGE	IN	IN DOOR : L OUT DOOR : H
24	FA OUT	FULL AUTO	IN	FULL AUTO WHITE : L STANDERD : H
25	FADER	FADER	IN	FADER IN : H FADER OUT : L
26	VDD	POWER SOURCE	IN	+5 V POWER SOURCE TERMINAL
27	AUTO F	AUTO FOCUS	IN	MANUAL : L AUTO FOCUS : H
28	3/4	GND		GND
29	NC	–		NO CONNECT
30	CONT 1	CONTROL (1)	IN	OUT DOOR : H IN DOOR : L
31	CONT 2	GND		GND
32	PBL 1	GND		GND
33	PBL 2	–	IN	EE : H PB : L
34	NC	–		NO CONNECT
35	$\overline{RST}$	RESET	IN	TO RESET TIMMING PULSE GENERATOR RESET : L
36	SMTH	SMOOTH OUT PUT	OUT	INDICATION OUTPUT
37	NC	–		NO CONNECT
38	CF	CORRECT FOCUS	IN	CORRECT FOCUS DETECTED : L
39	BF	BIHIND FOCUS	IN	BIHIND FOCUS DETECTED : L
40	FF	FRONT FOCUS	IN	FRONT FOCUS DETECTED : L
41	STD	GND		GND
42	LLL	$\overline{LOW\ LIGHT}$	IN	LOW LIGHT (IRIS OPEN) : L
43	PAL	PAL MODE		NTSC MODE : L PAL MODE : OPEN
44	BATT	BATTERY DOWN	IN	BATTERY DOWN : L

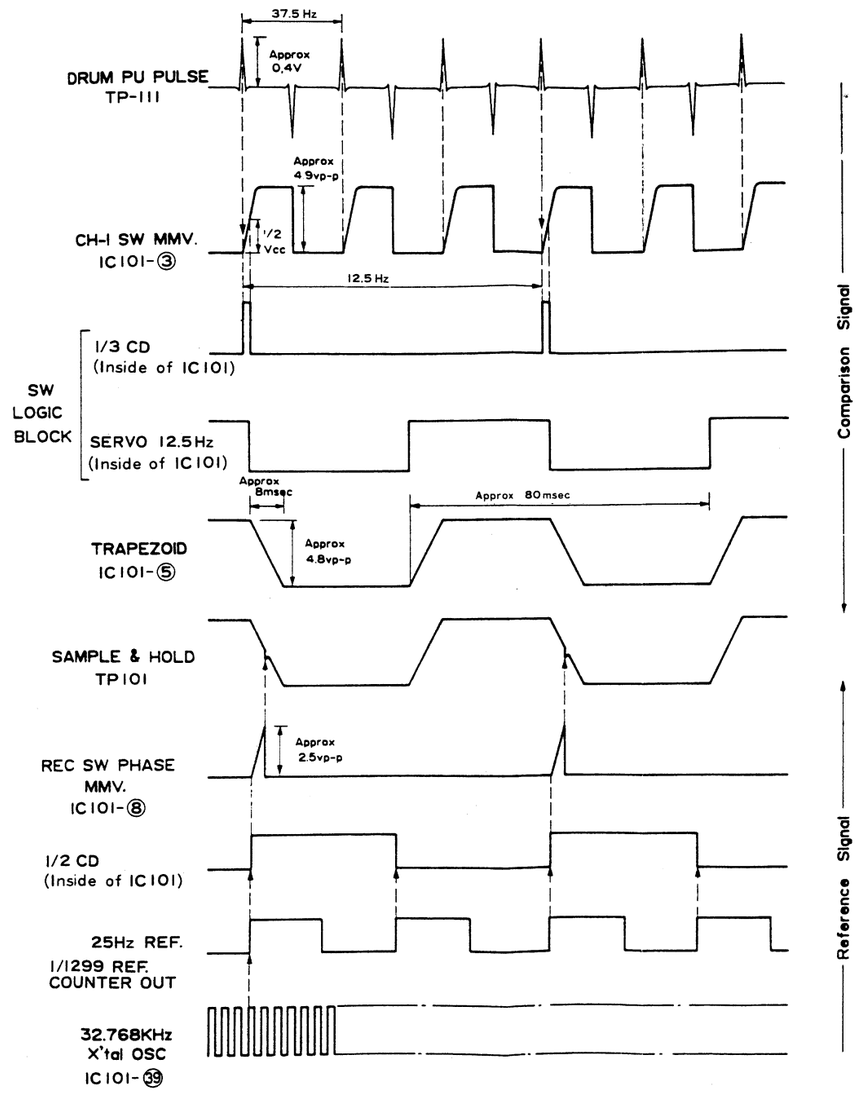
4.14 SERVO TIMING CHART

4.14.1 DRUM SERVO TIMING CHART

REC MODE



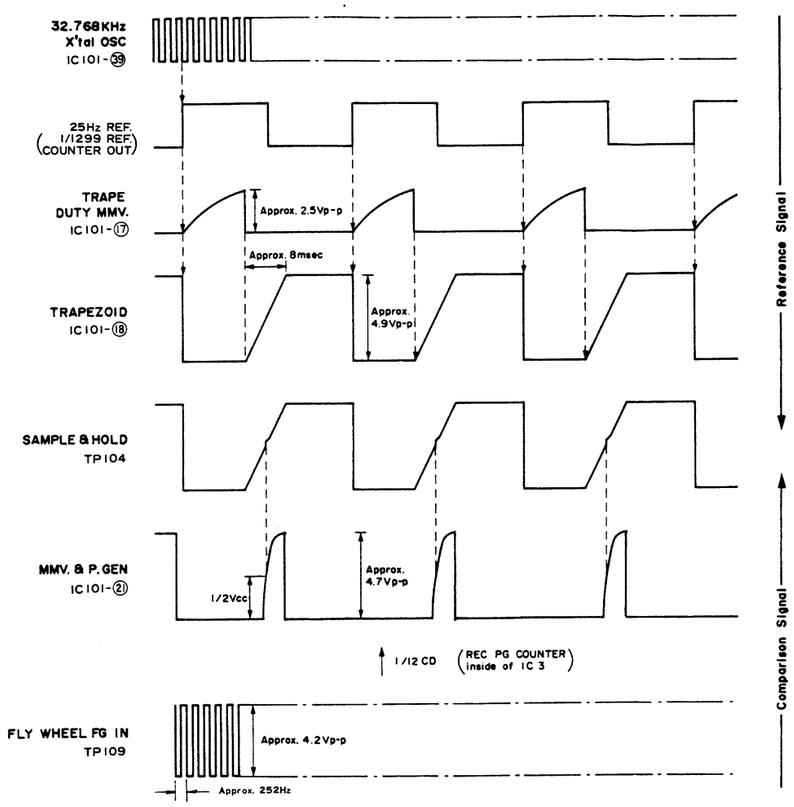
P.B MODE



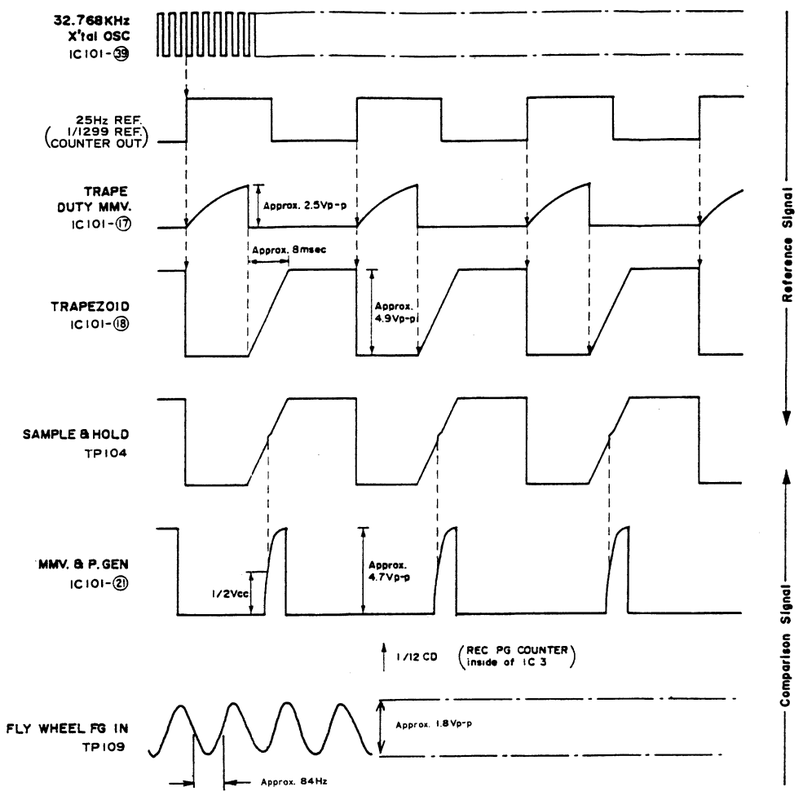
4-27

4.14.2 CAPSTAN SERVO TIMING CHART

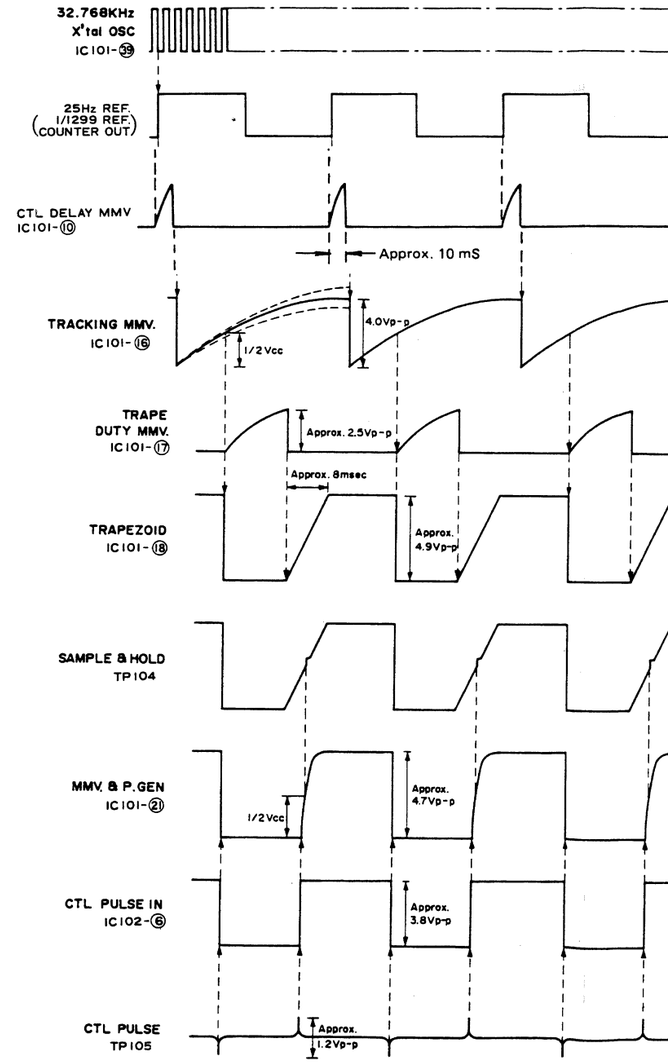
REC MODE



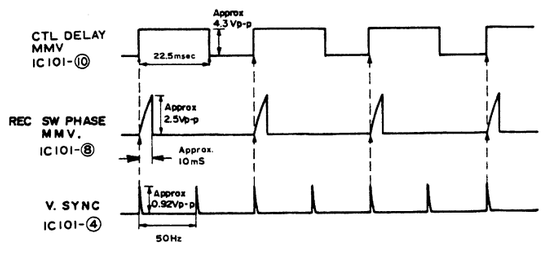
P.B MODE (LP)



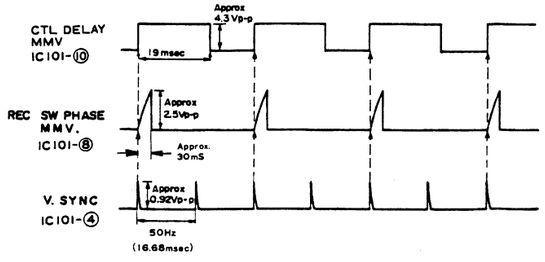
P.B MODE (SP)



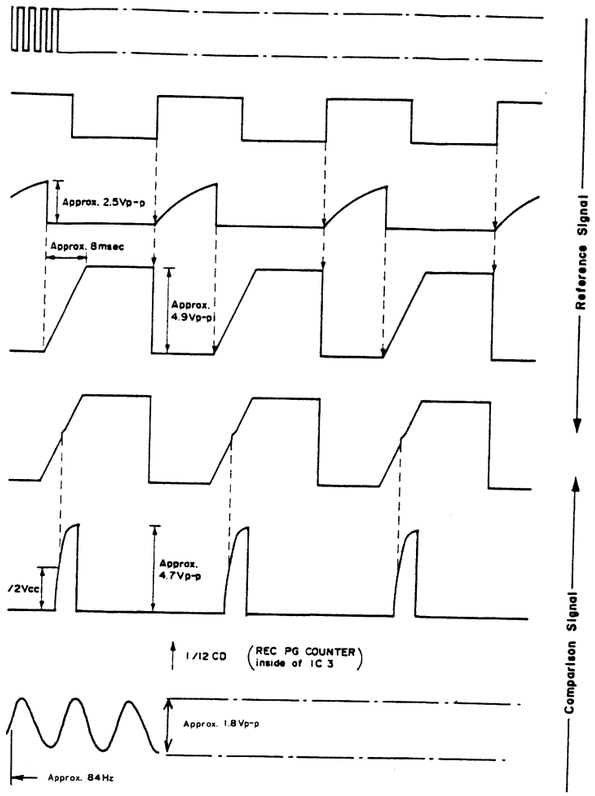
REC CTL PULSE



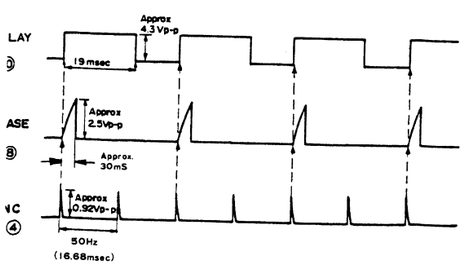
REC CTL PULSE



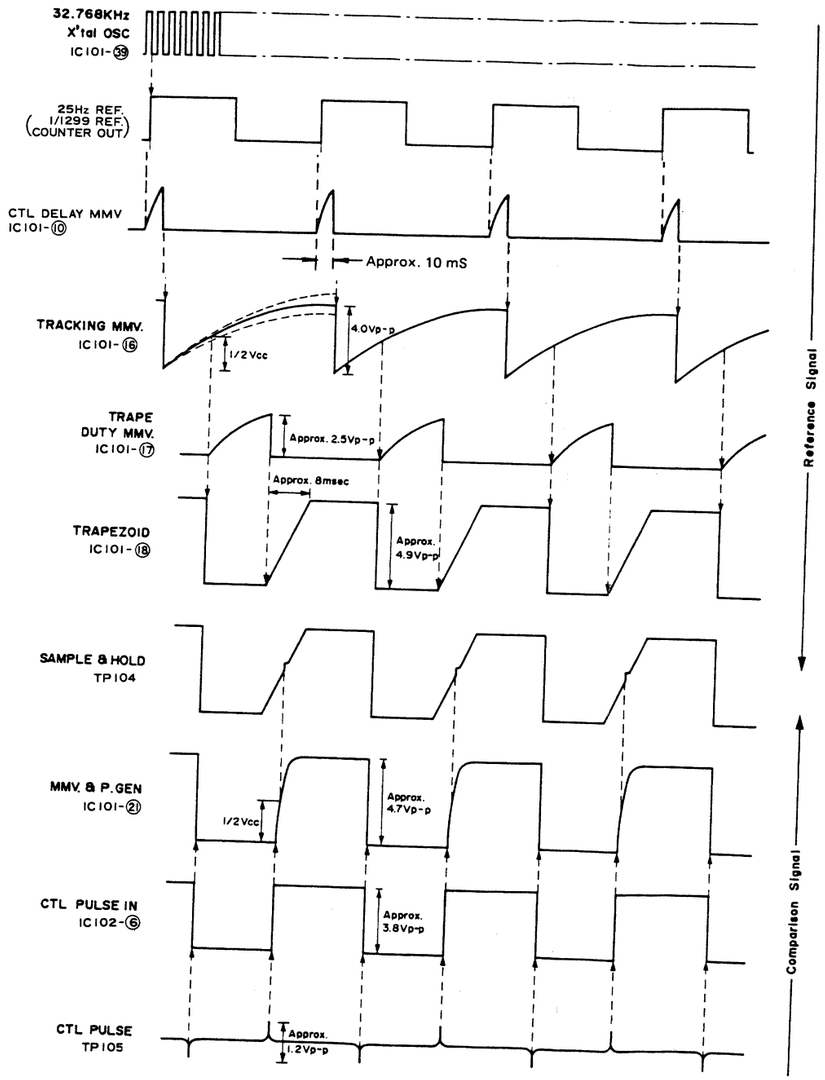
P. B MODE (LP)



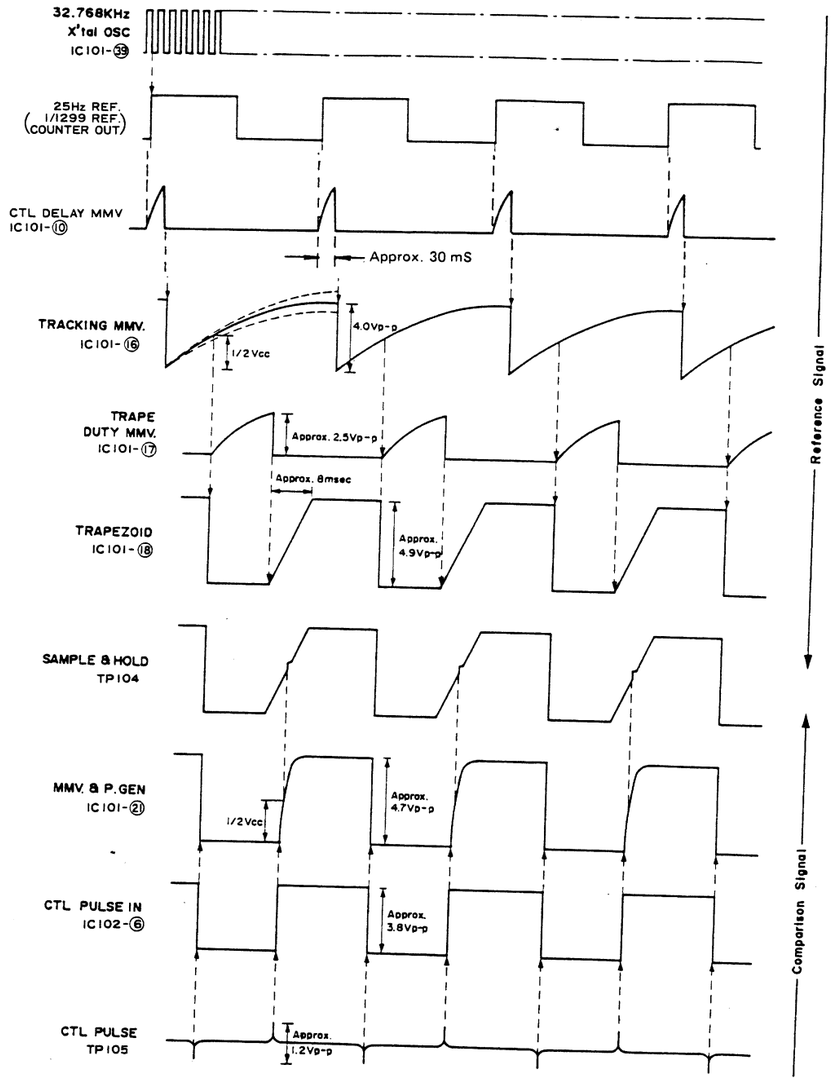
REC CTL PULSE



P. B MODE (SP)

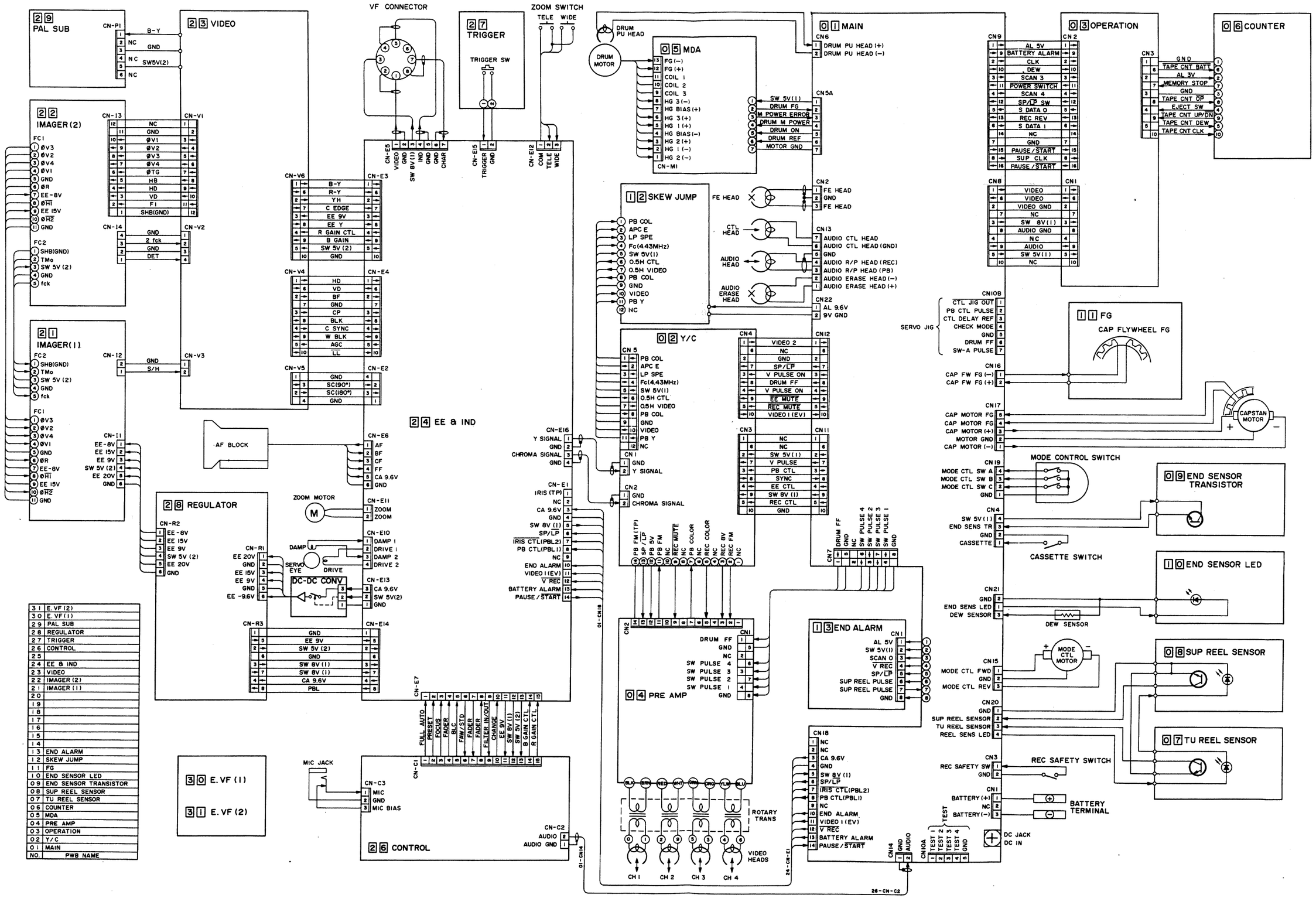


P. B MODE (SP)



4-28

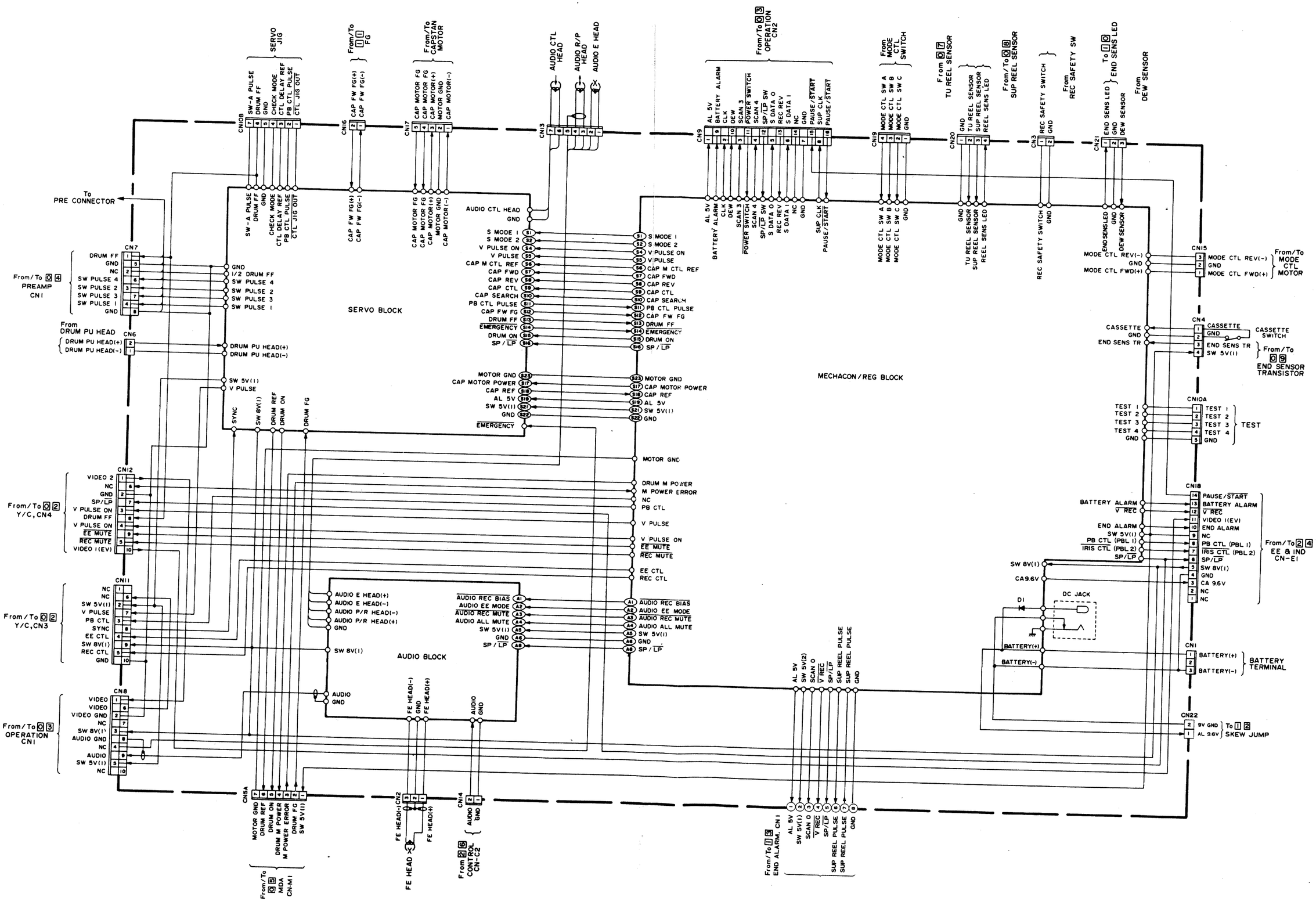
4.15 OVERALL WIRING



31	E. VF (2)
30	E. VF (1)
29	PAL SUB
28	REGULATOR
27	TRIGGER
26	CONTROL
25	
24	EE & IND
23	VIDEO
22	IMAGER (2)
21	IMAGER (1)
20	
19	
18	
17	
16	
15	
14	
13	END ALARM
12	SKEW JUMP
11	FG
10	END SENSOR LED
09	END SENSOR TRANSISTOR
08	SUP REEL SENSOR
07	TU REEL SENSOR
06	COUNTER
05	MDA
04	PRE AMP
03	OPERATION
02	Y/C
01	MAIN
NO.	PWB NAME

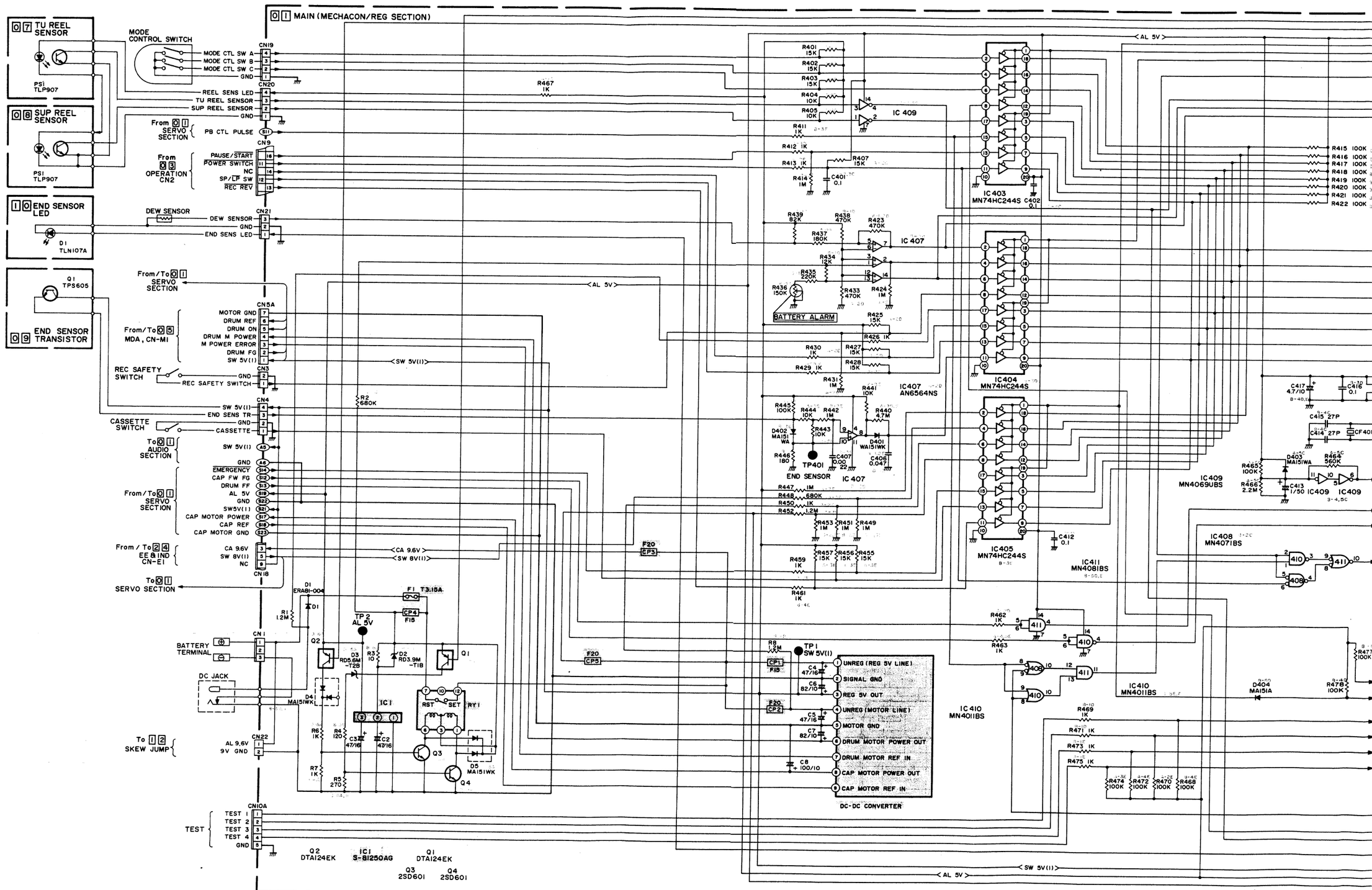
4-29

4.16 MAIN BOARD BLOCK DIAGRAM

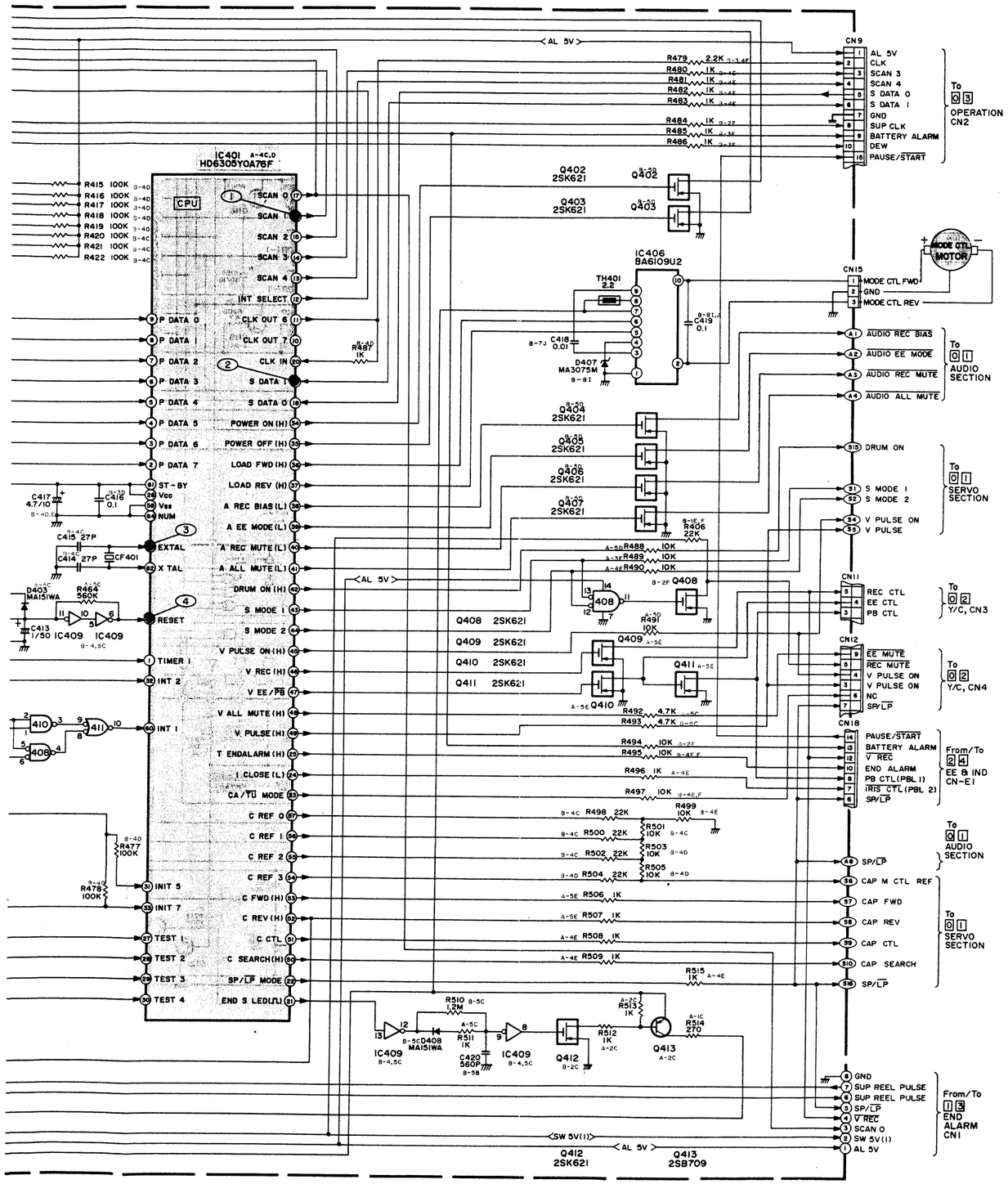


4-30

4.17 MECHACON & REGULATOR SCHEMATIC DIAGRAM

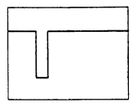


4-31



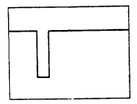
— Waveforms of mechacon circuit —

1



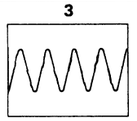
IC401-16 pin
STOP
4.86 Vp-p

2



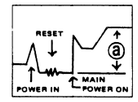
IC401-19 pin
STOP
4.95 Vp-p

3



IC401-63 pin
STOP
3.4 Vp-p

4

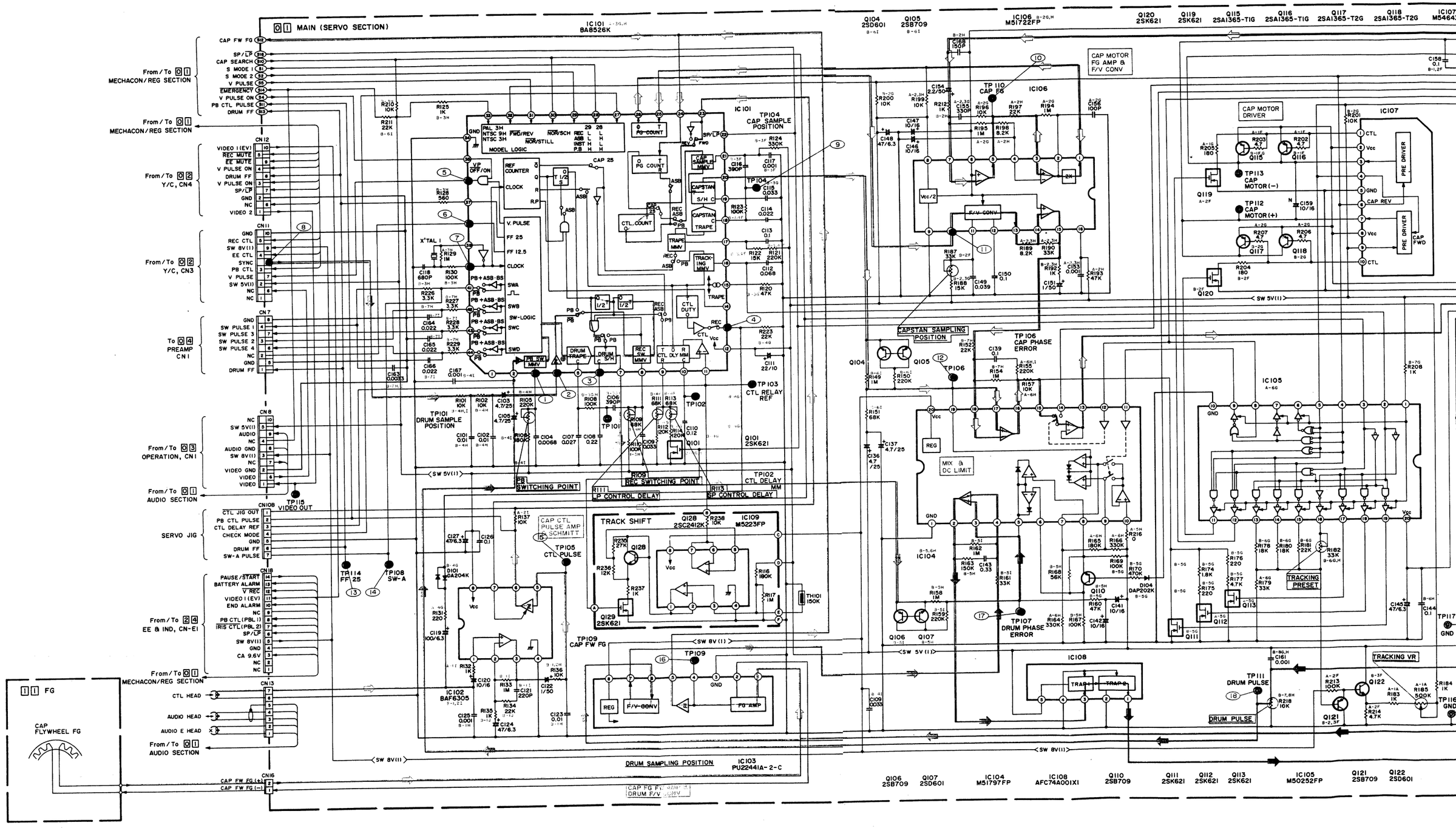


IC401-59 pin
MAIN POWER ON
ⓐ 5 Vp-p

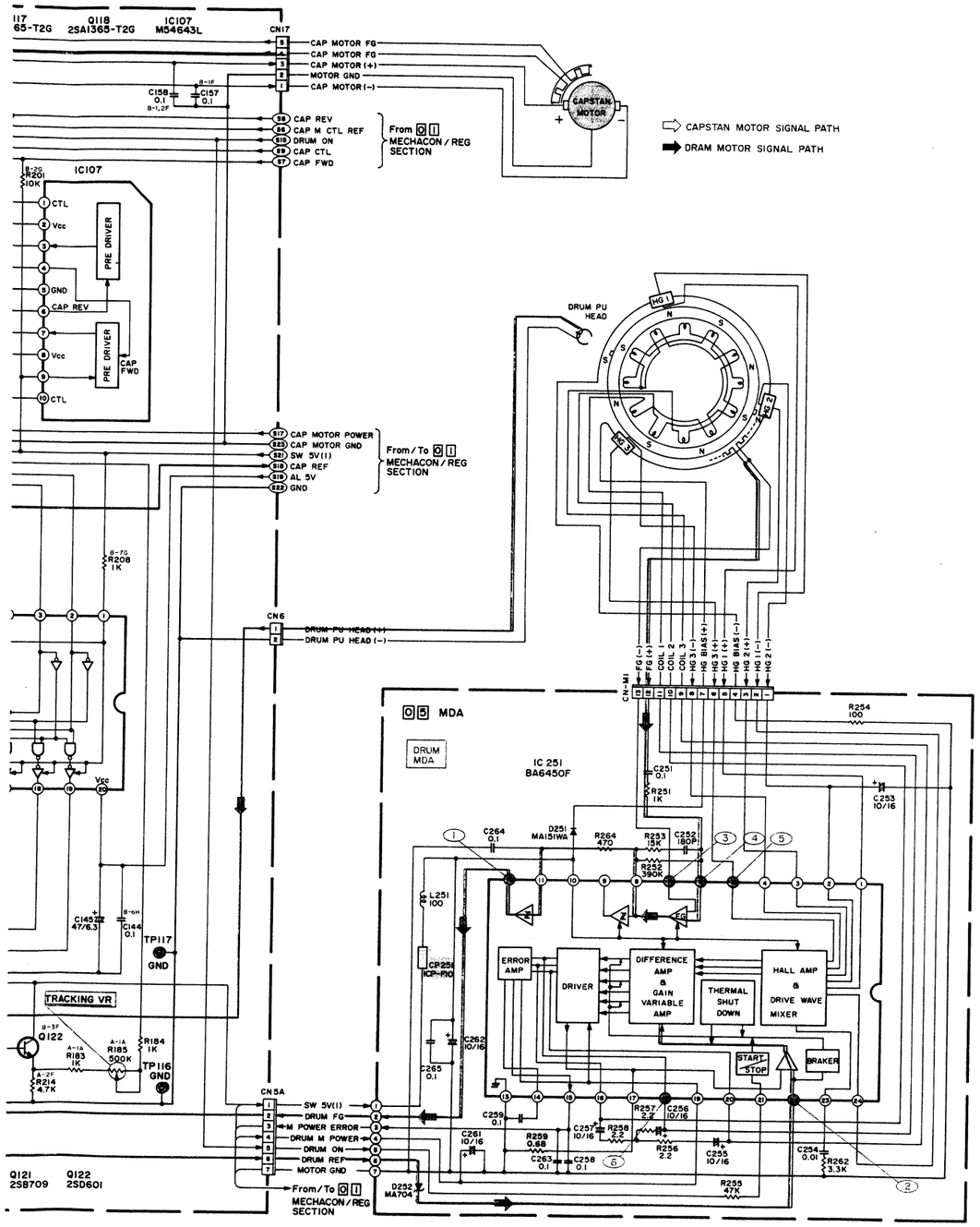
NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4.18 SERVO & MDA SCHEMATIC DIAGRAMS



4-32



NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

— Waveforms of servo circuit —

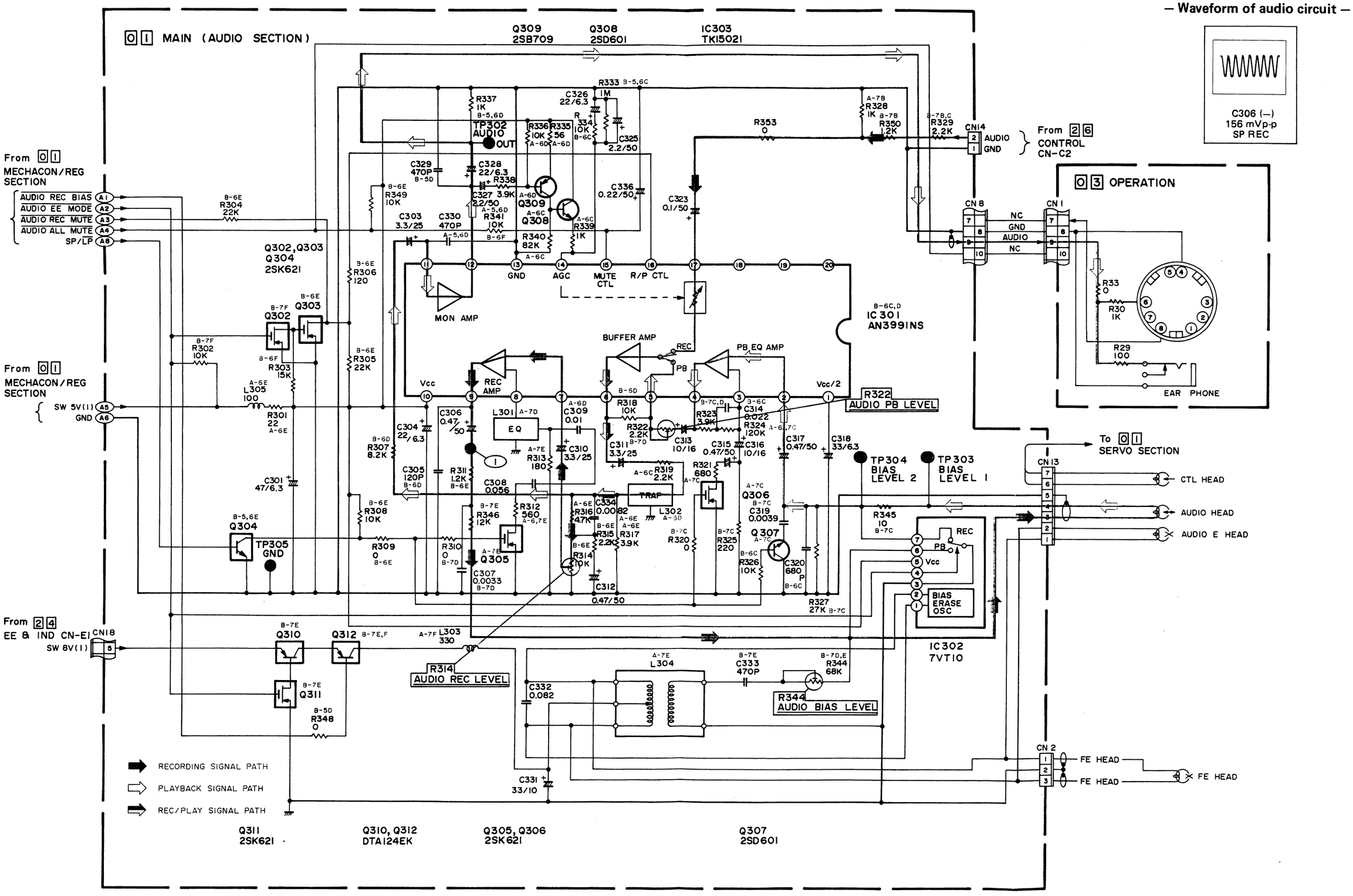
1	2	3	4	5
IC101-3 pin PB SW MMV 4.8 Vp-p	IC101-4 pin SYNC IN 1 Vp-p	IC101-6 pin SP REC 2.5 V DC	IC101-13 pin SP REC 4.3 Vp-p	IC101-36 pin V. PULSE 4.7 Vp-p
6	**7**	**8**	**9**	
IC101-38 pin FF12.5 4.7 Vp-p	IC101-40 pin X'TAL 32.768 kHz 3.35 Vp-p	CN11-8 pin SYNC 4.7 Vp-p	TP104 CAP SAMPLE 5 Vp-p	
10		**11**		
TP110 (SP REC) CAP FG 3 Vp-p	TP110 (LP REC) CAP FG 2.45 Vp-p	IC106-10 pin (SP REC) CAP SAMPLE 5 Vp-p	IC106-10 pin (LP REC) CAP SAMPLE 5 Vp-p	
12	**13**	**14**		
TP106 CAP PHASE ERROR 2.35 V DC	TP114 FF25 4.2 Vp-p	TP108 SW-A PULSE 4.46 Vp-p		
	15			
	TP105(REC) CTL PULSE 2.4 Vp-p	TP105(PB) CTL PULSE 2.4 Vp-p		
	16			
	TP109 (SP REC) CAP FW FG 2.6 Vp-p	TP109 (LP REC) CAP FW FG 2.3 Vp-p		
17		**18**		
TP107 DRUM PHASE ERROR 2.5 V DC		TP111 DRUM PULSE 0.7 Vp-p		

— Waveforms of MDA circuit —

1	2	3
IC251-12 pin DRUM FG 4.3 Vp-p	IC251-22 pin DRUM REF 1.4 V DC	IC251-7 pin FG (–) 1.98 V DC
	4	
	IC251-6 FG (+) (SP REC) 31 mVp-p	IC251-6 pin FG (+) (LP REC) 1.98 V DC
5		**6**
IC251-5 pin HG 3 (+) 3.95 V DC		IC251-18 pin DRUM COIL 1 5.8 Vp-p

4-32

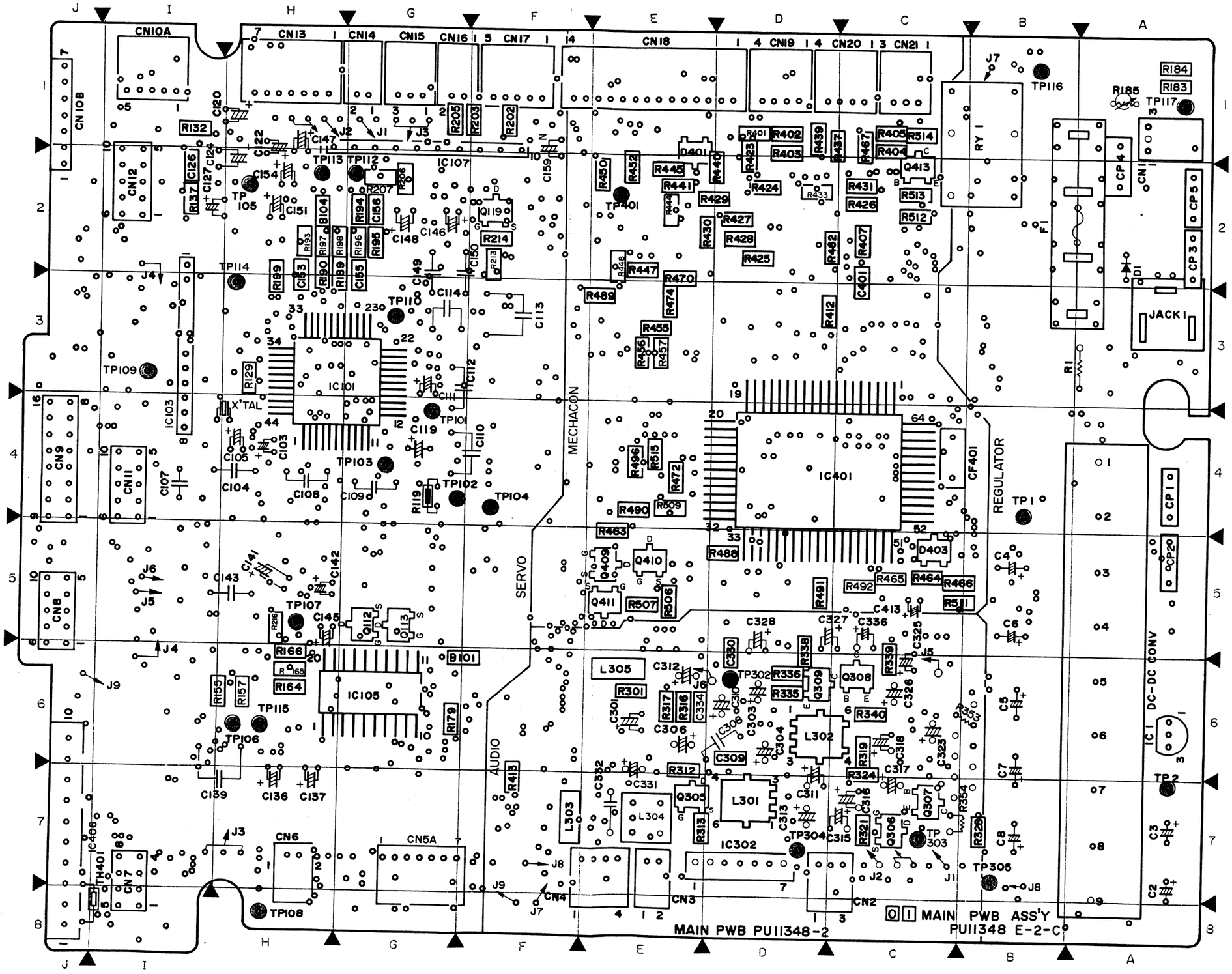
4.19 AUDIO SCHEMATIC DIAGRAM



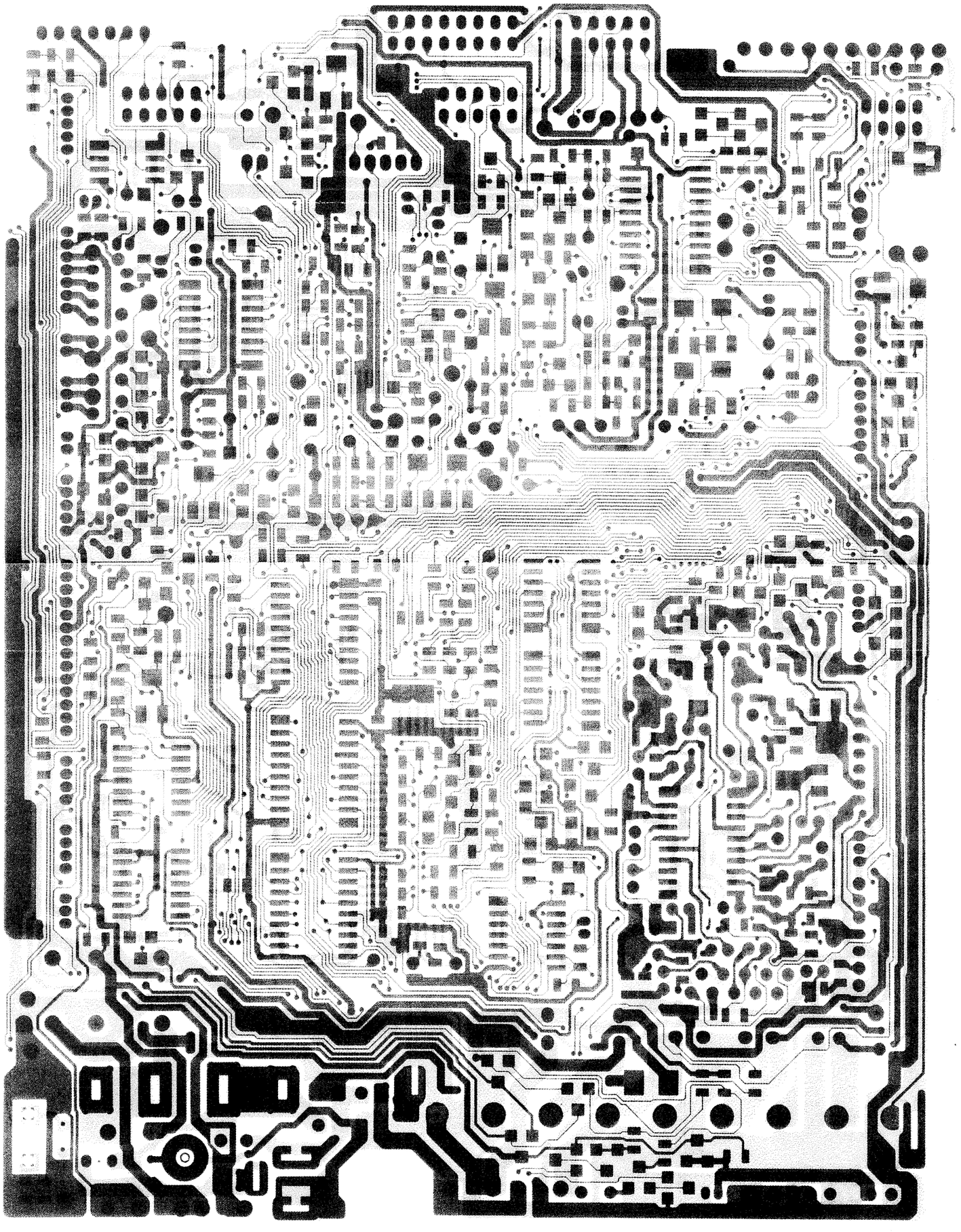
4-33

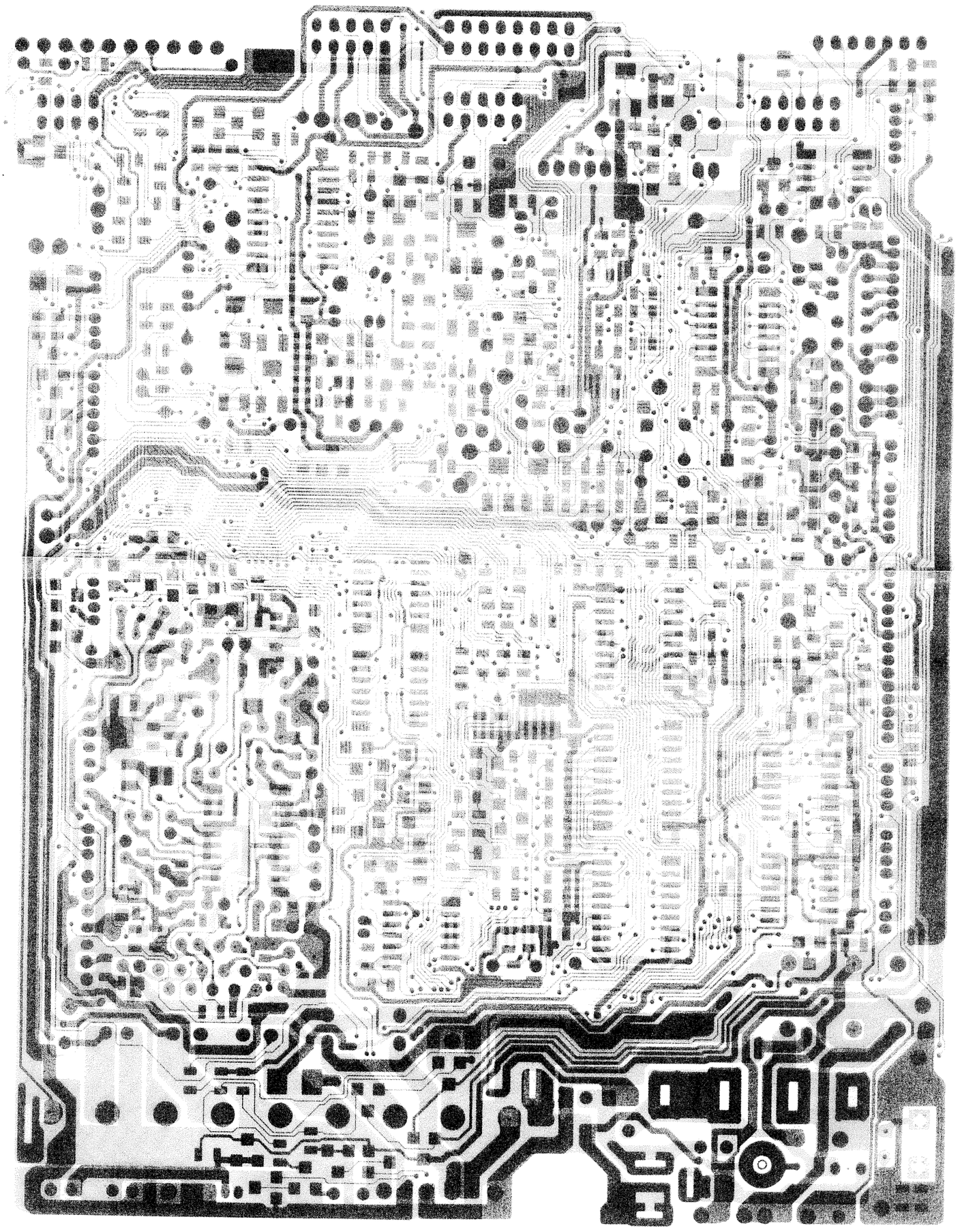
4.20 MAIN CIRCUIT BOARD

— Front side —

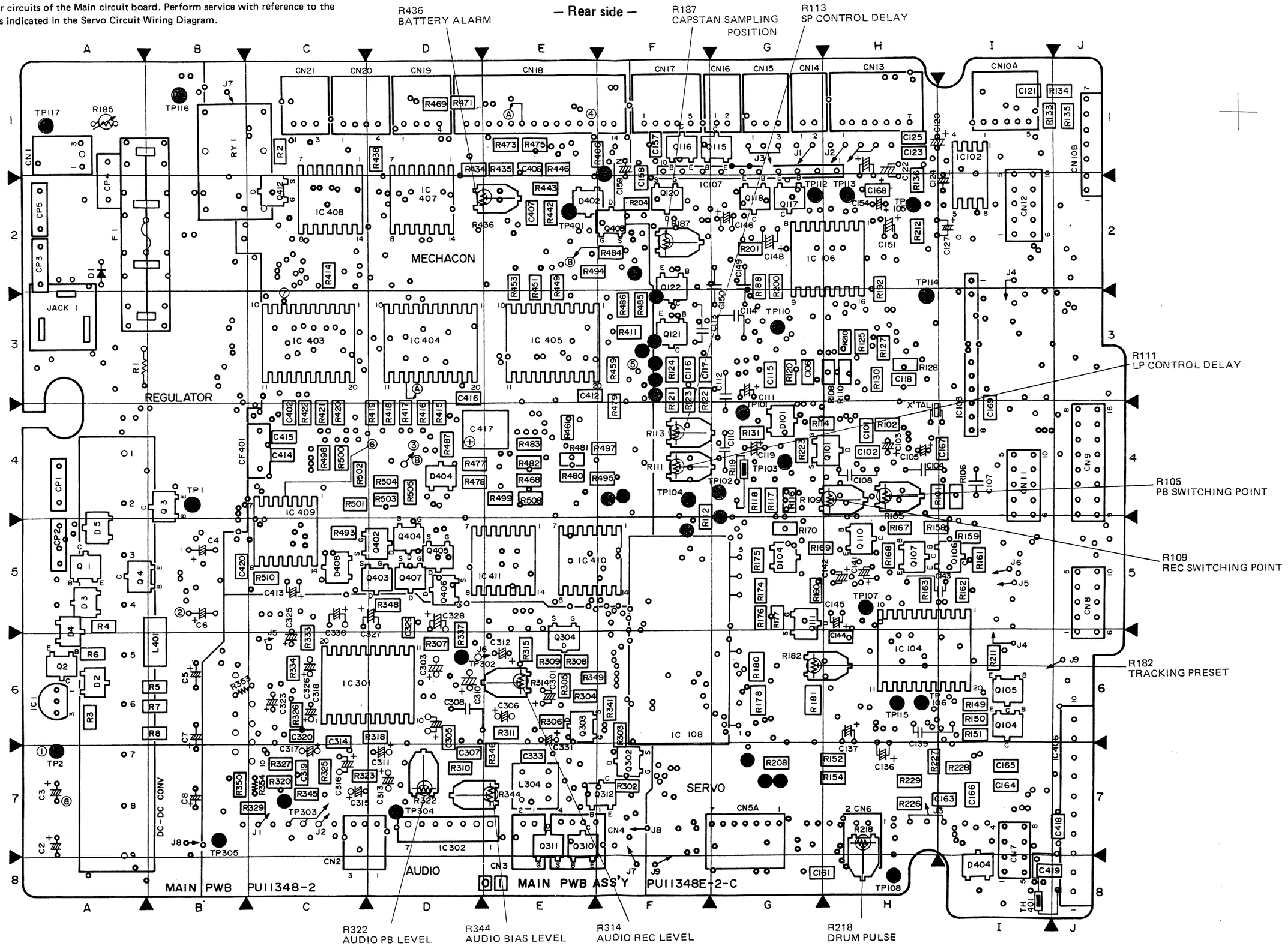


4-34



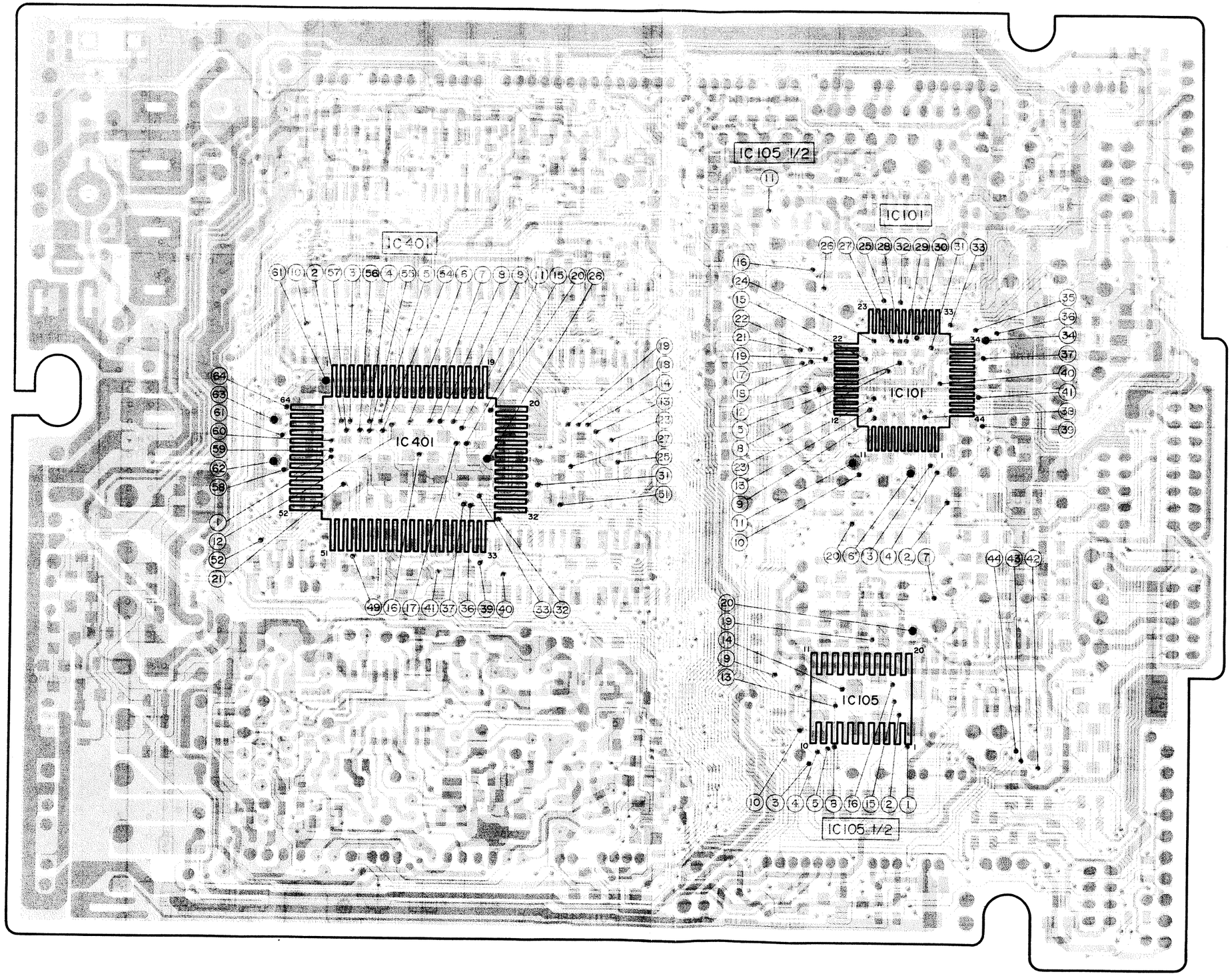


Note: S12 on the circuit board refers to the data line between the Mechacon CPU and the other circuits of the Main circuit board. Perform service with reference to the positions indicated in the Servo Circuit Wiring Diagram.



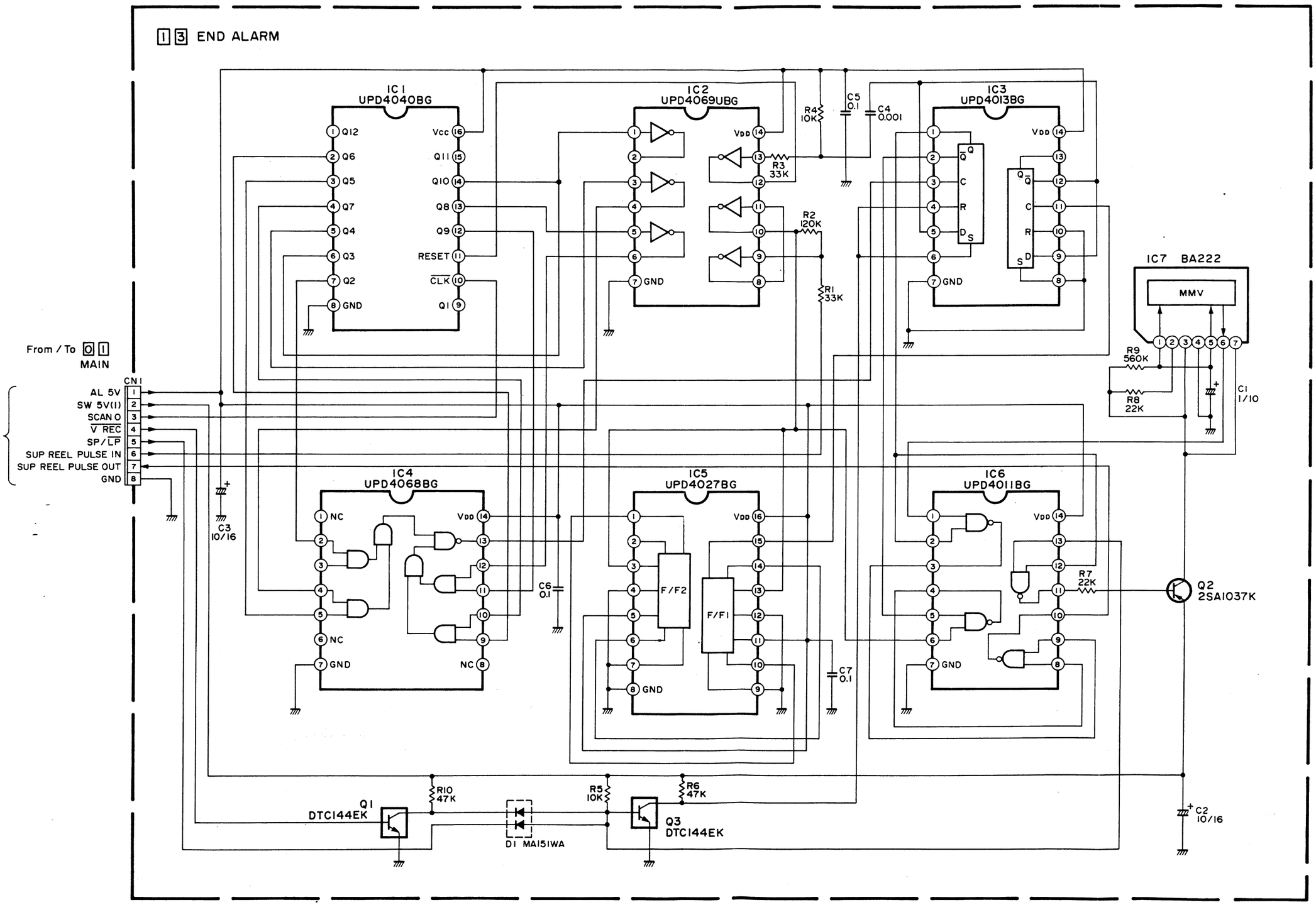
4.21 MAIN BOARD THROUGH HOLE LOCATION

Notes: 1. Number show pin numbers of IC's.
2. Use for checking IC's.



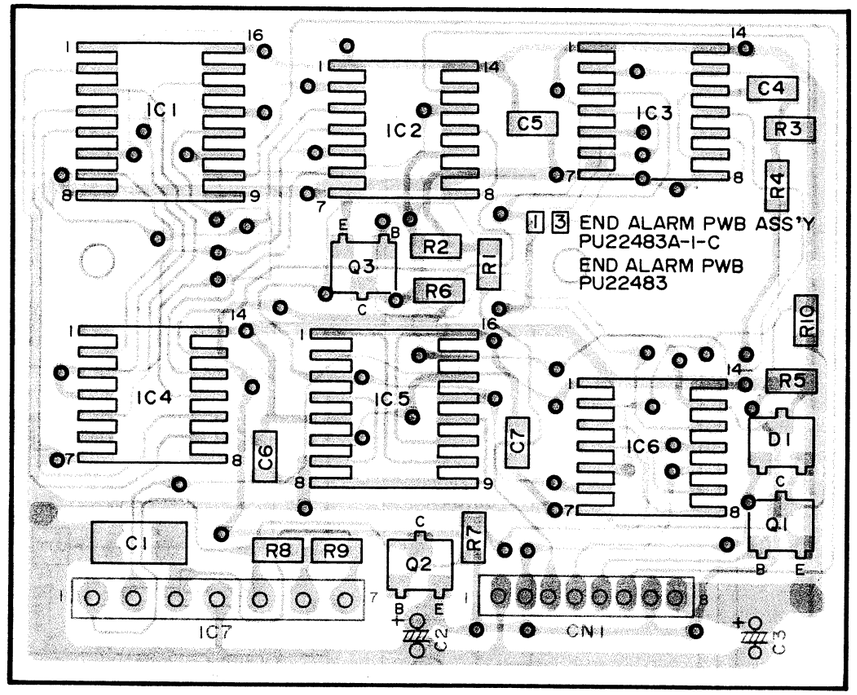
4-36

4.22 END ALARM SCHEMATIC DIAGRAM

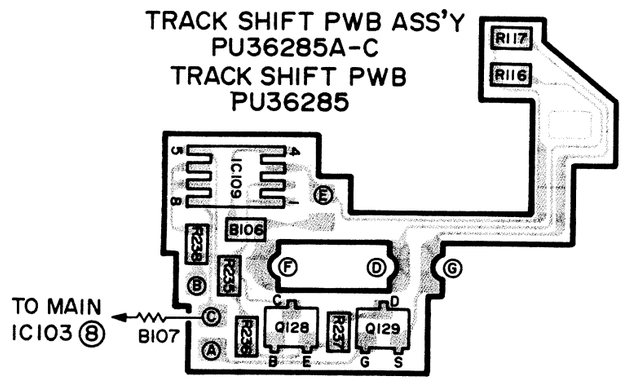


4-37

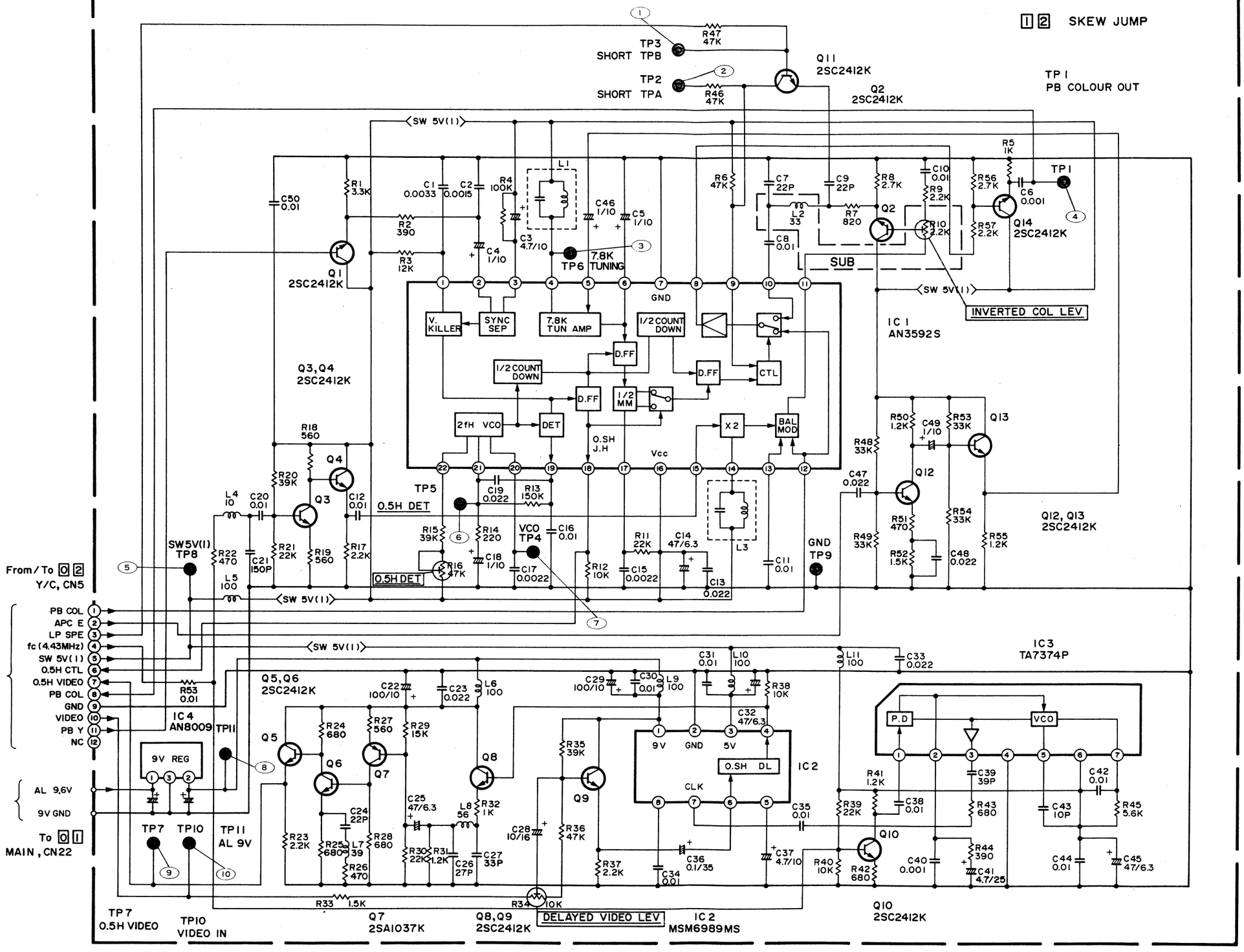
4.23 END ALARM CIRCUIT BOARD

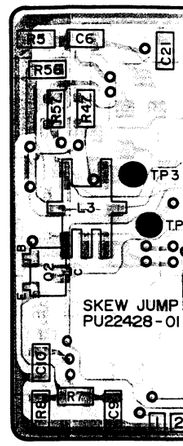


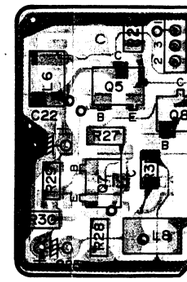
4.24 TRACK SHIFT CIRCUIT BOARD



TRACK SHIFT	MAIN	TRACK SHIFT	MAIN
Ⓐ	IC101 ㉓	Ⓔ	TH101
Ⓑ	IC101 ⑪	Ⓕ	NEARBY GND
Ⓒ	B107	Ⓖ	CN5A ⑦ (GND)
Ⓓ	IC101 ⑫		



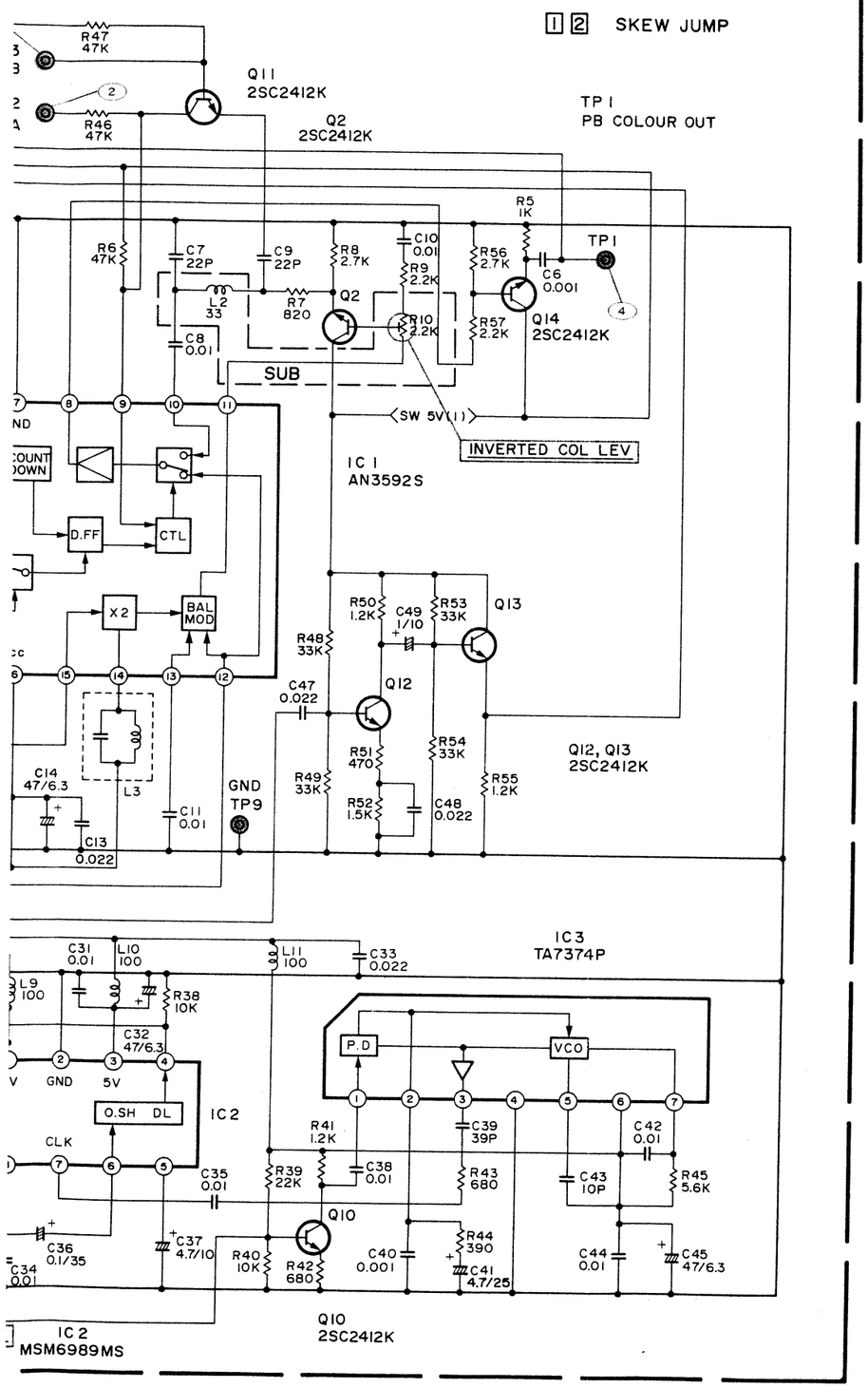


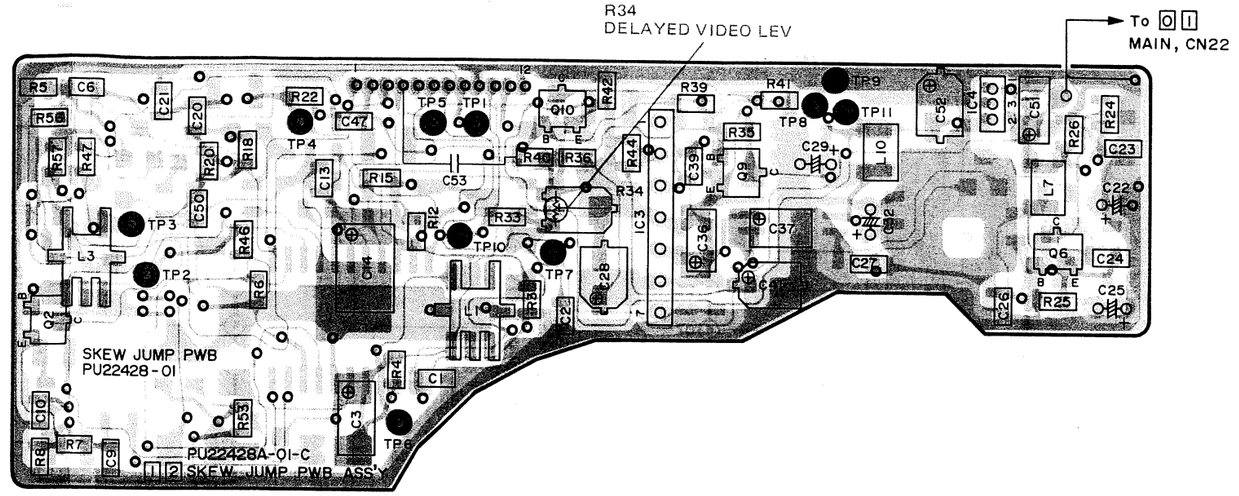


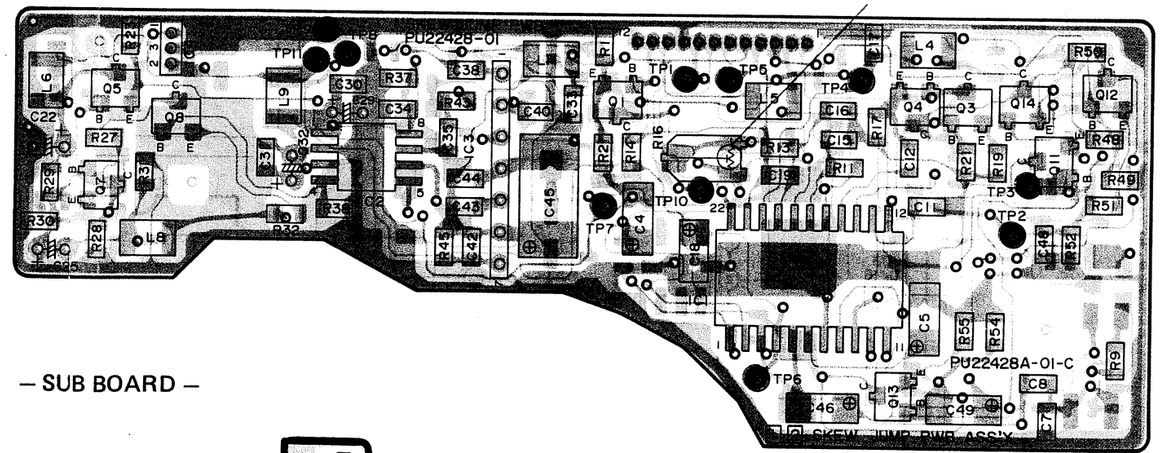
— SUB BOARD

SUB
PU5
SUB
PU5

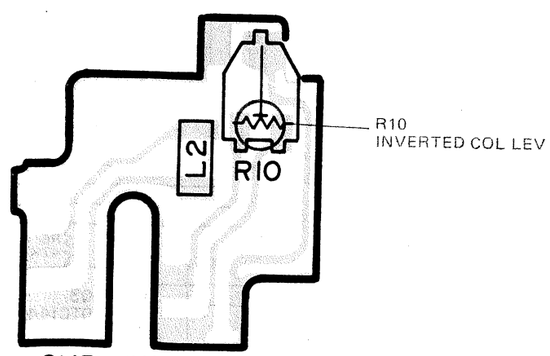
4.26 SKEW JUMP AND SUB CIRCUIT BOARD







— SUB BOARD —

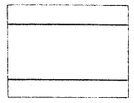
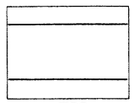
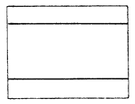
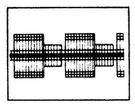
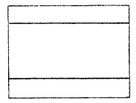
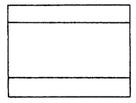
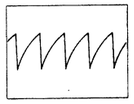
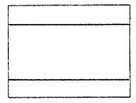
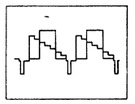
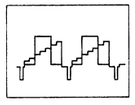


SUB PWB ASS'Y
PU59780A-C
SUB PWB
PU59780

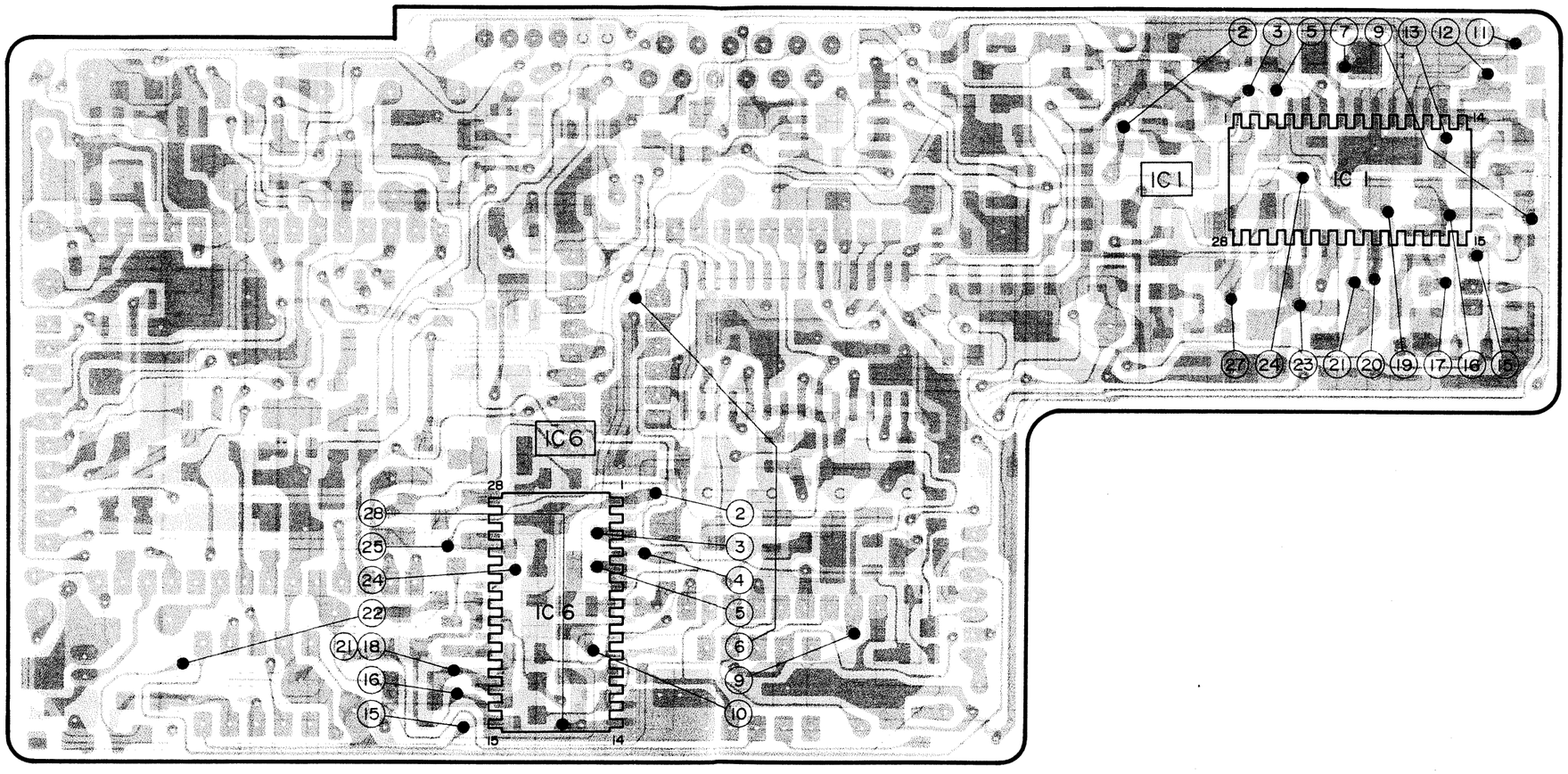
4-38

4.27 Y/C BOARD THROUGH HOLE LOCATION

– Waveform of skew jump circuit –

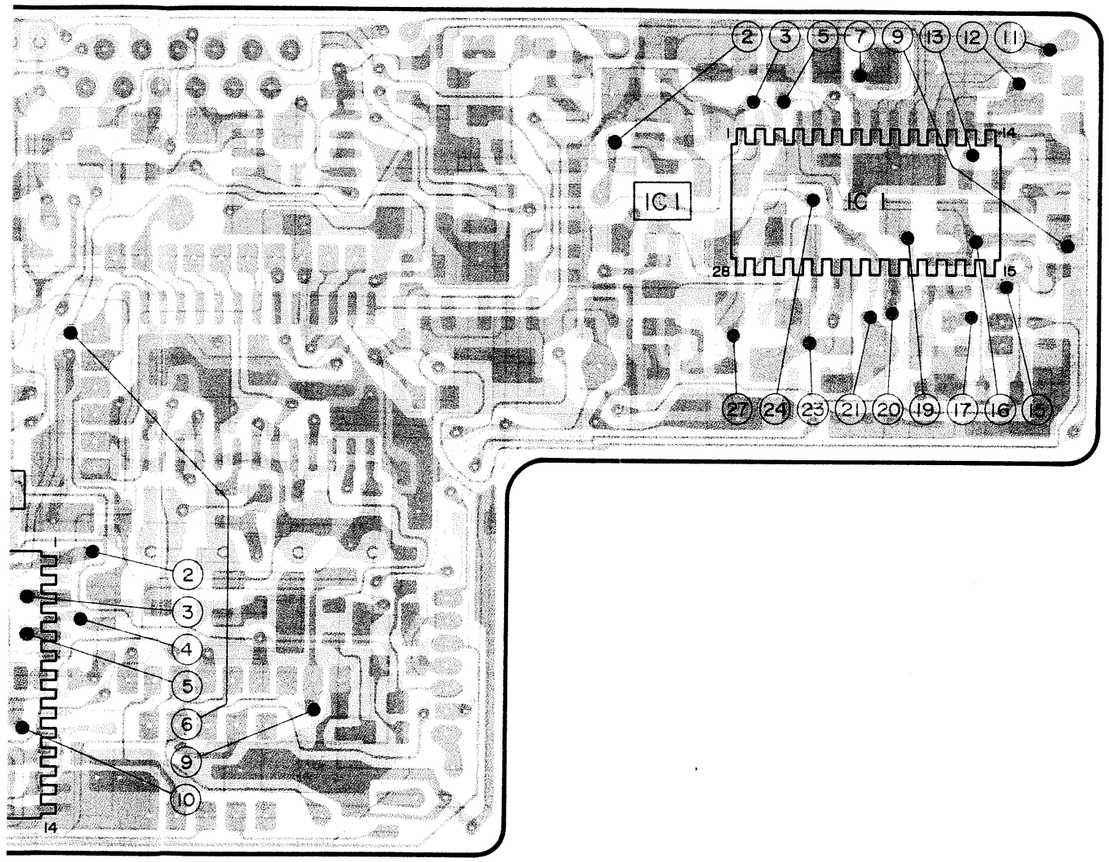
1	2
	
TP3 SHORT TP B NORMAL:0.6 VDC SEARCH: 0 V	TP2 SHORT TPA FF, REW, SEARCH 4.8 V DC
3	4
	
TP6 7.8 K TUNING 5 V DC	TP1 PB COLOR OUT 0.4 Vp-p
5	6
	
TP8 SW 5 V (1) 5 V DC	TP5 0.5 M DET 2.5 V DC
7	8
	
TP4 VCO 2.5 Vp-p	TP11 AL 9 V 9 V DC
9	10
	
TP7 0.5 H VIDEO 1.1 Vp-p	TP10 VIDEO IN 1.1 Vp-p

Notes: 1. Number show pin number of IC's.
2. Use for checking IC's.



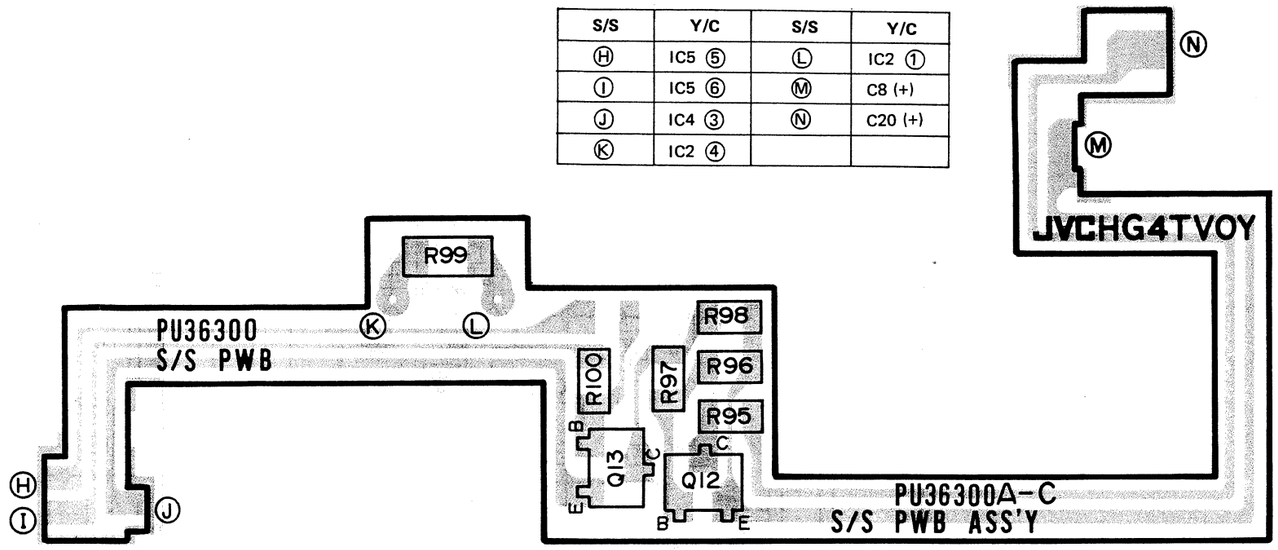
3-39

Notes: 1. Number show pin number of IC's.
2. Use for checking IC's.

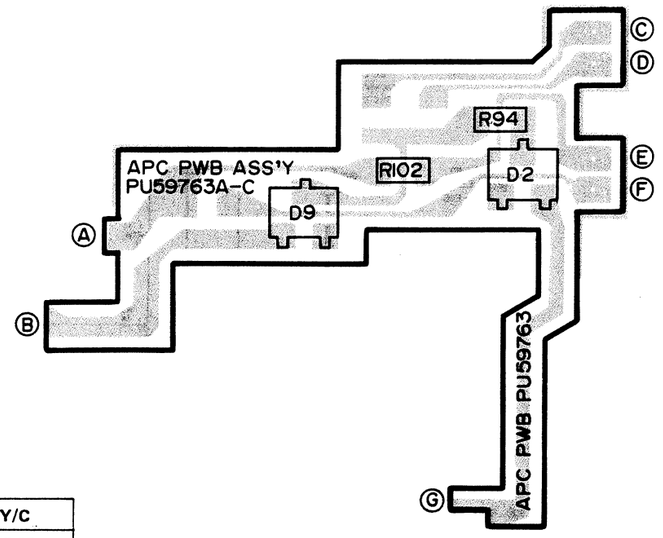


4.28 S/S CIRCUIT BOARD

S/S	Y/C	S/S	Y/C
Ⓗ	IC5 ⑤	Ⓛ	IC2 ①
Ⓘ	IC5 ⑥	Ⓜ	C8 (+)
Ⓙ	IC4 ③	Ⓝ	C20 (+)
Ⓚ	IC2 ④		

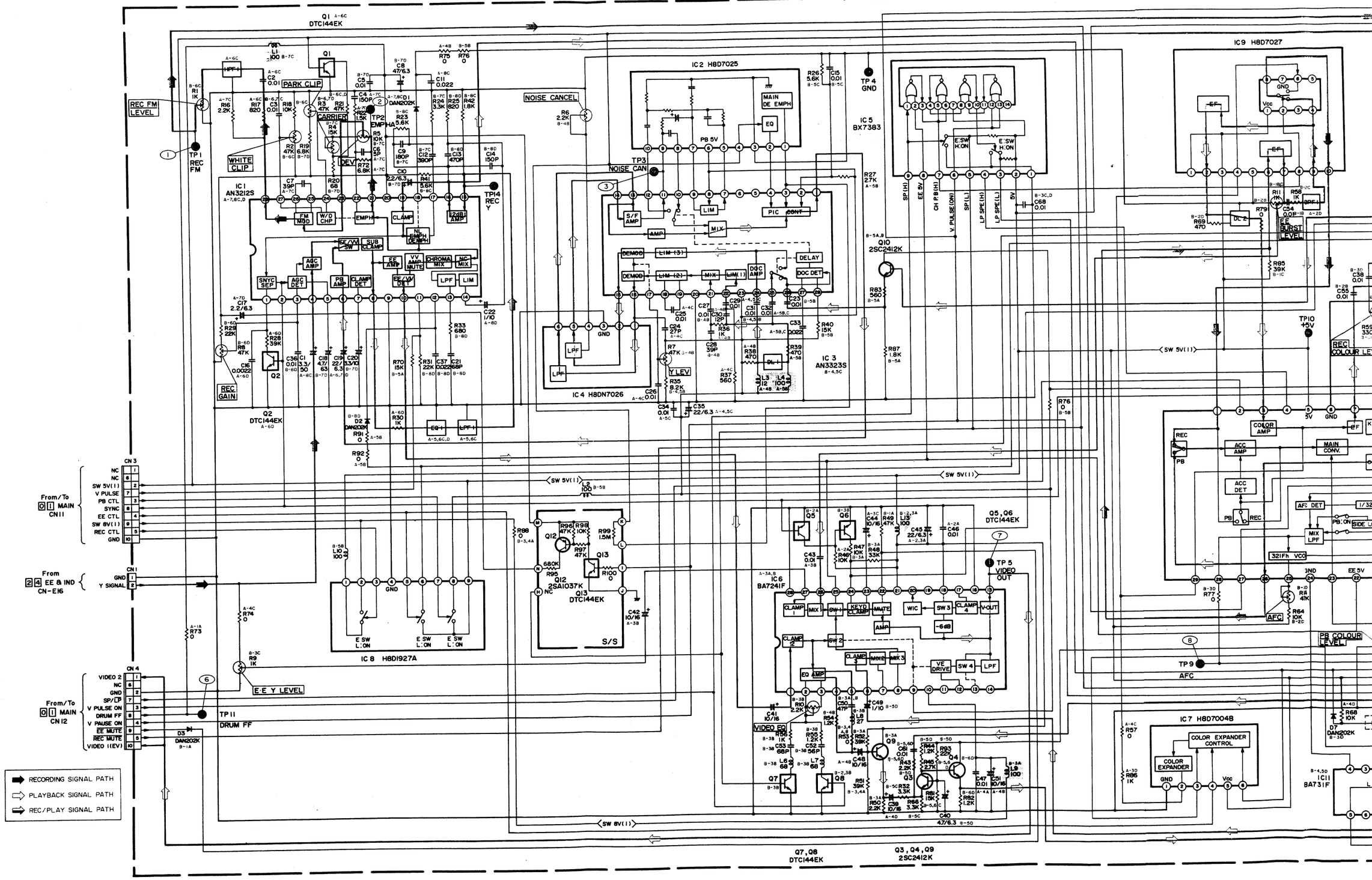


4.29 APC CIRCUIT BOARD

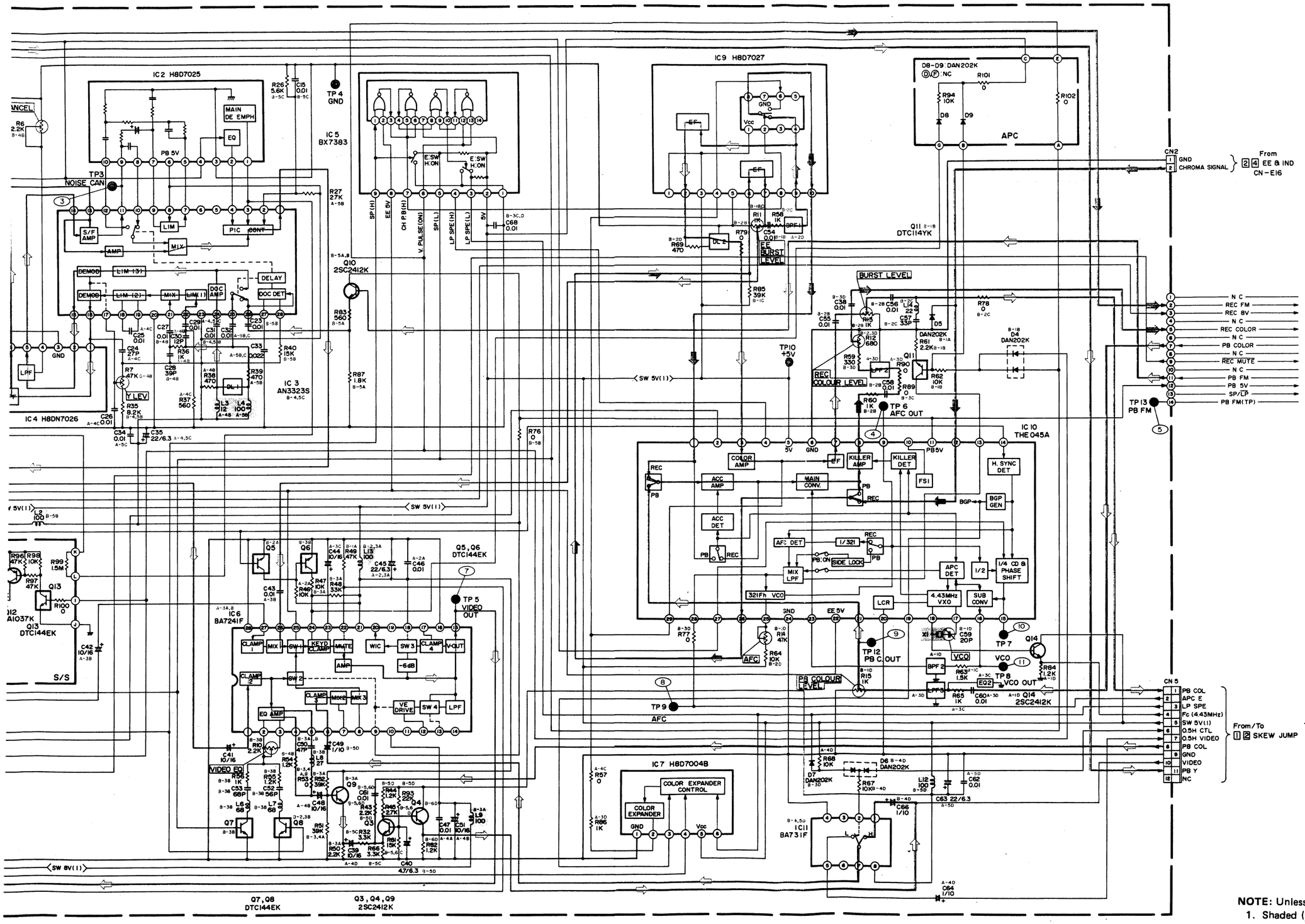


APC	Y/C	APC	Y/C
Ⓐ	R75/D4	Ⓔ	D4/R75
Ⓑ	Q11 B/R62	Ⓕ	IC5 ⑦
Ⓒ	IC5 ②	Ⓖ	R47/R48
Ⓓ	IC5 ③		

4.30 Y/C, PRE AMP & PRE SWITCH SCHEMATIC DIAGRAMS



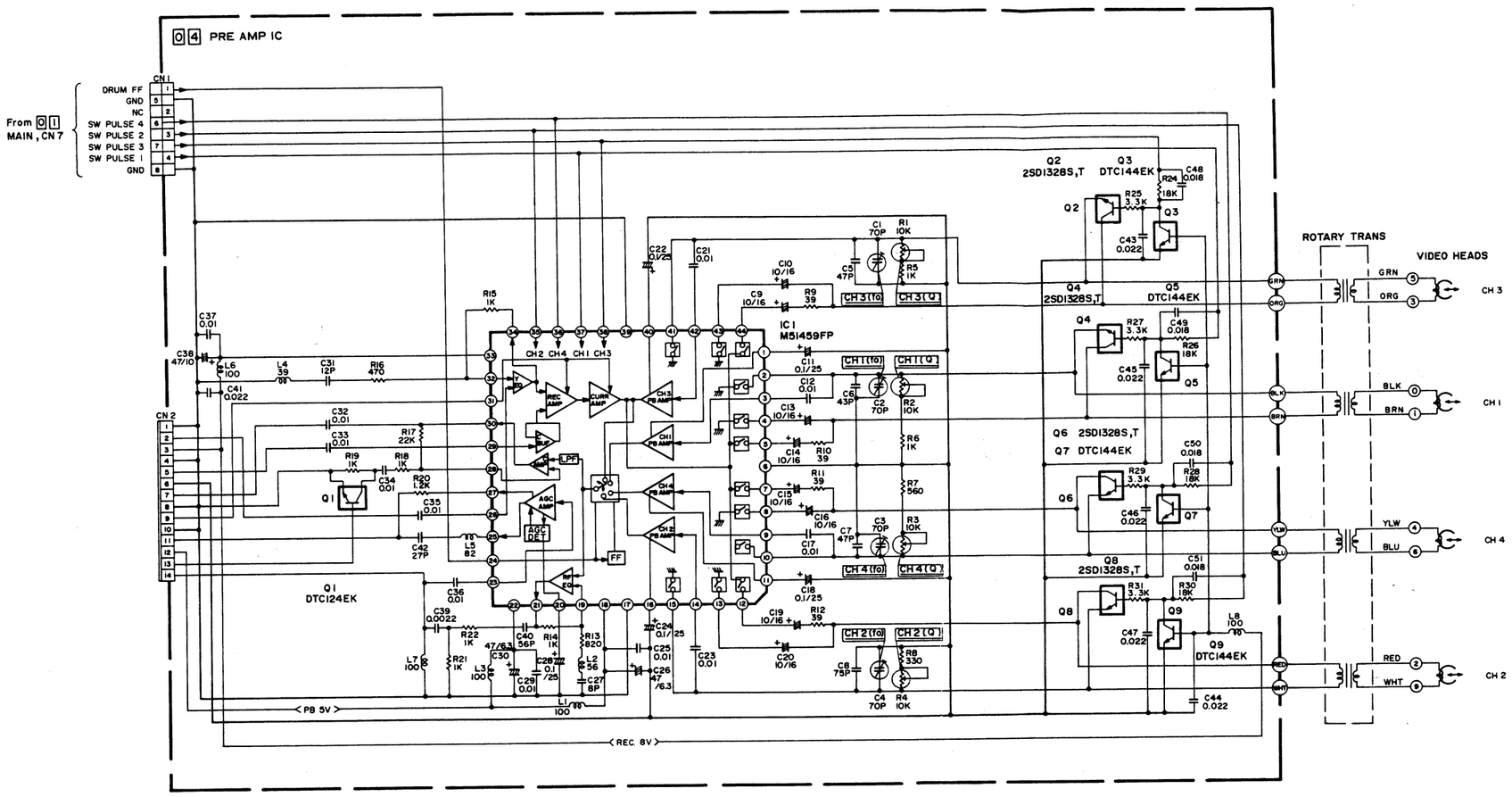
4-40
4-40



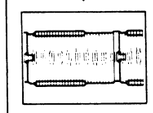
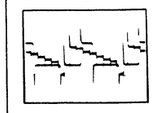
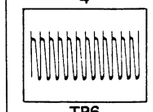
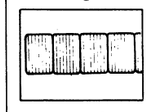
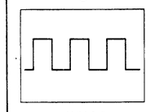
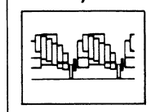
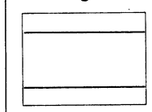
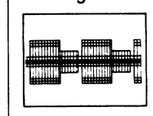
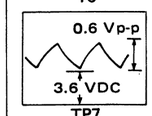
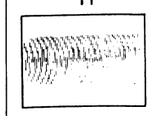
NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4-40



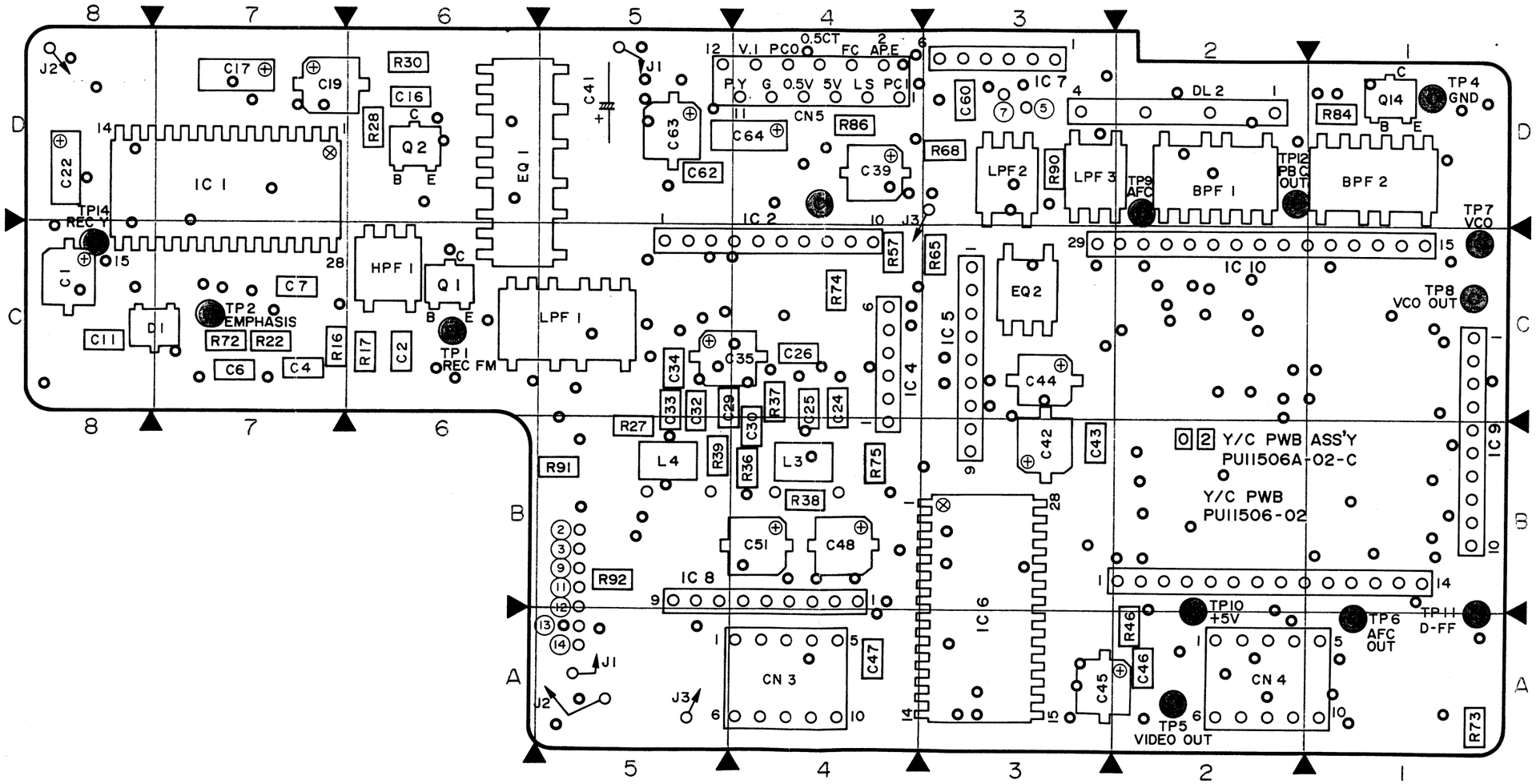
— Waveforms of Y/C circuit —

1  TP1 REC FM 160 mVp-p	2  TP2 EMPHASIS 0.76 Vp-p
3 TP3 NOISE CANCEL SP REC	4  TP6 AFC 0.7 Vp-p 5.15 MHz
5  TP13 PB FM 0.18 Vp-p	6  TP11 DRUM FF 4 Vp-p
7  TP5 VIDEO OUT 1.8 Vp-p	8  TP9 AFC ERROR 2.5 V DC
9  TP12 PB COLOR 0.2 Vp-p	10  0.6 Vp-p 3.6 VDC TP7 1/4 CD & PHASE SHIFT 0.6 Vp-p
	11  TP8 VCO OUT 0.9 Vp-p

4-41

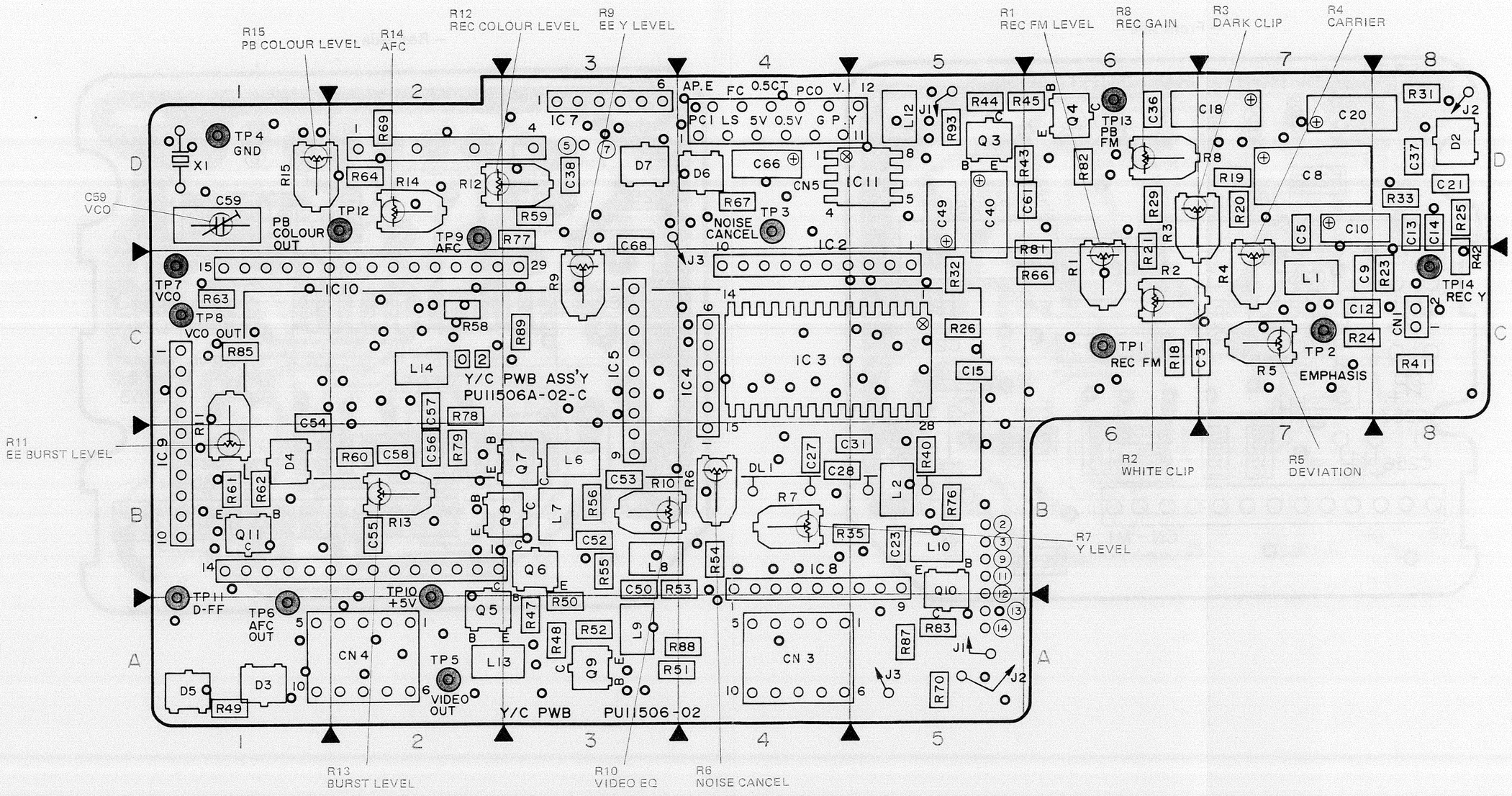
4.31 Y/C CIRCUIT BOARD

— Front side —



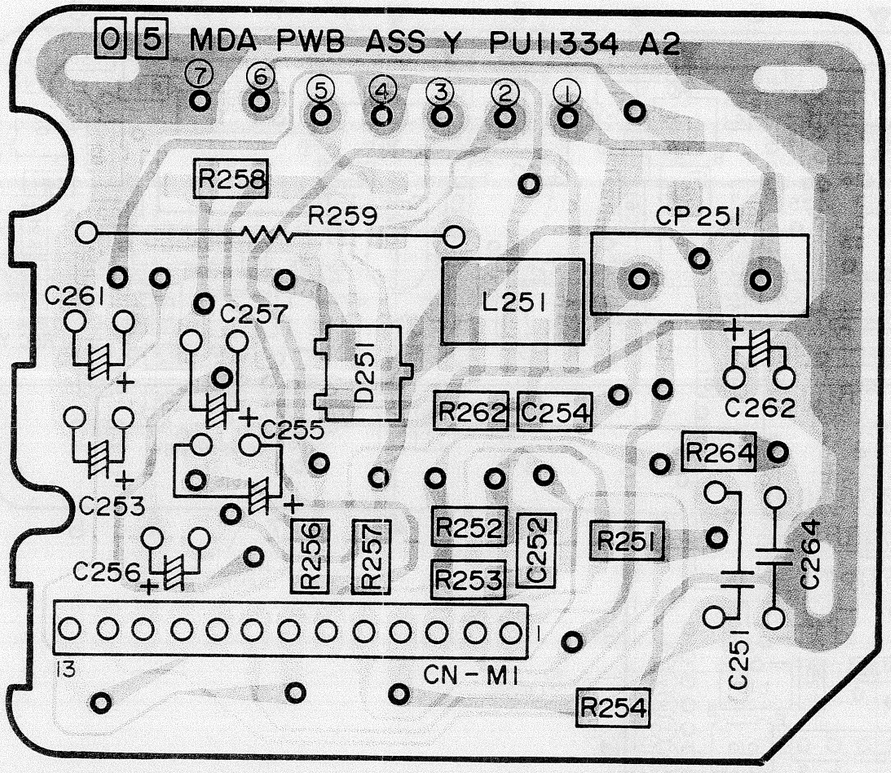
4-42

— Rear side —

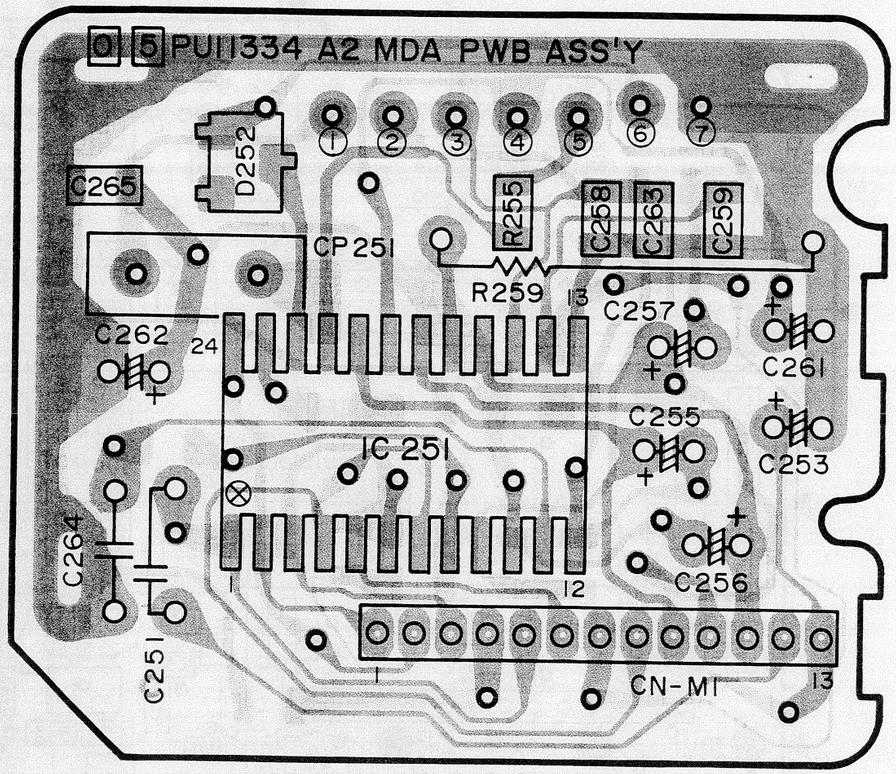

R15
PB COLOUR LEVEL
R14
AFC
R12
REC COLOUR LEVEL
R9
EE Y LEVEL
R1
REC FM LEVEL
R8
REC GAIN
R3
DARK CLIP
R4
CARRIER
C59
VCO
R11
EE BURST LEVEL
R13
BURST LEVEL
R10
VIDEO EQ
R6
NOISE CANCEL
R7
Y LEVEL
R2
WHITE CLIP
R5
DEVIATION
Y/C PWB ASS'Y
PU11506A-02-C
Y/C PWB PU11506-02
TP4
GND
TP12
PB
COLOUR
OUT
TP9
AFC
TP7
VCO
TP8
VCO OUT
TP11
D-FF
TP6
AFC
OUT
TP10
+5V
TP5
VIDEO
OUT
TP3
NOISE
CANCEL
TP13
PB
FM
TP1
REC FM
TP2
EMPHASIS
TP14
REC Y
IC7
IC10
IC2
IC3
IC4
IC5
IC8
IC9
IC11
CN4
CN3
CN5
CN1
X1
J1
J2
J3

4.32 MDA CIRCUIT BOARD

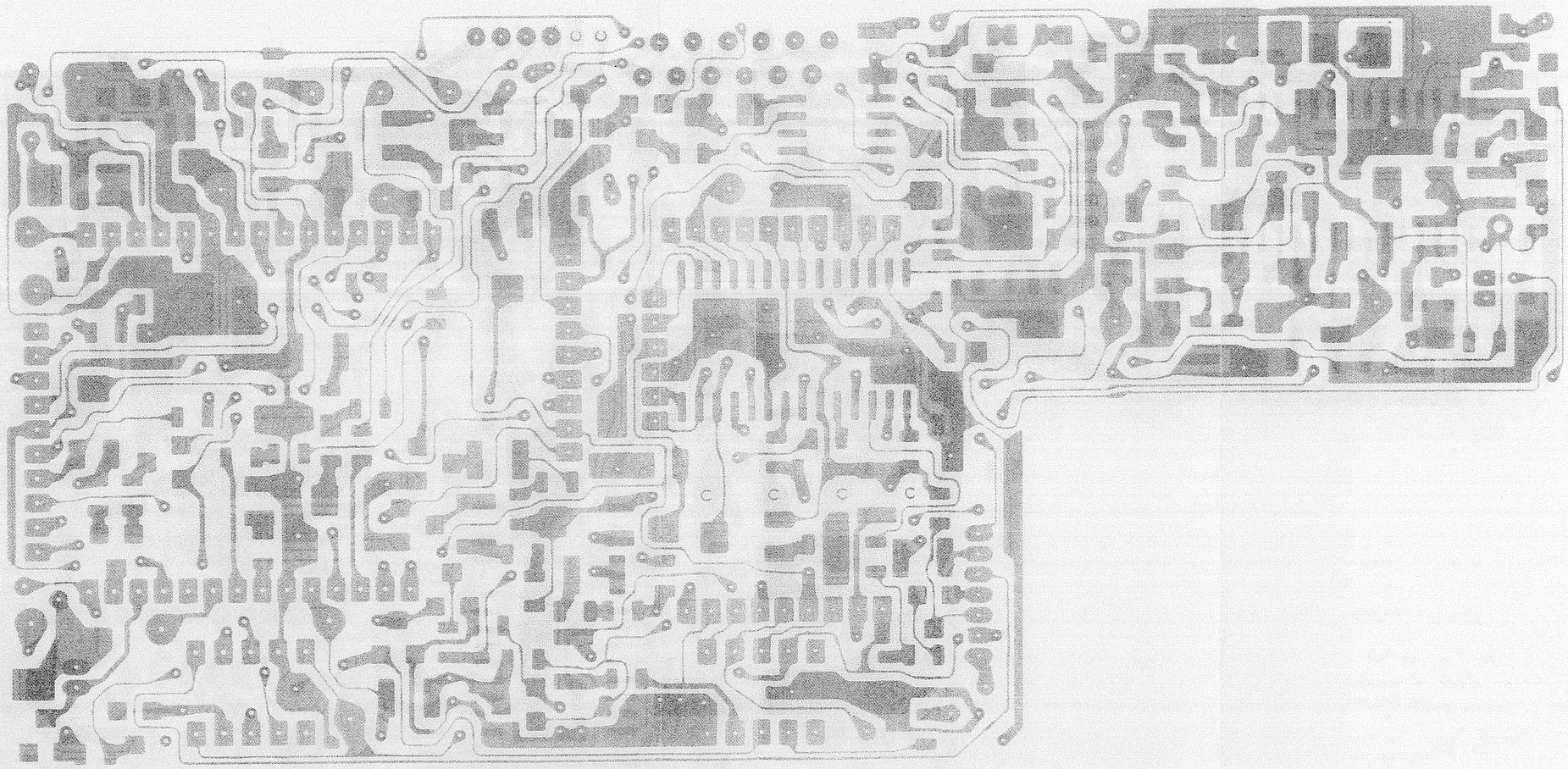
— Front side —

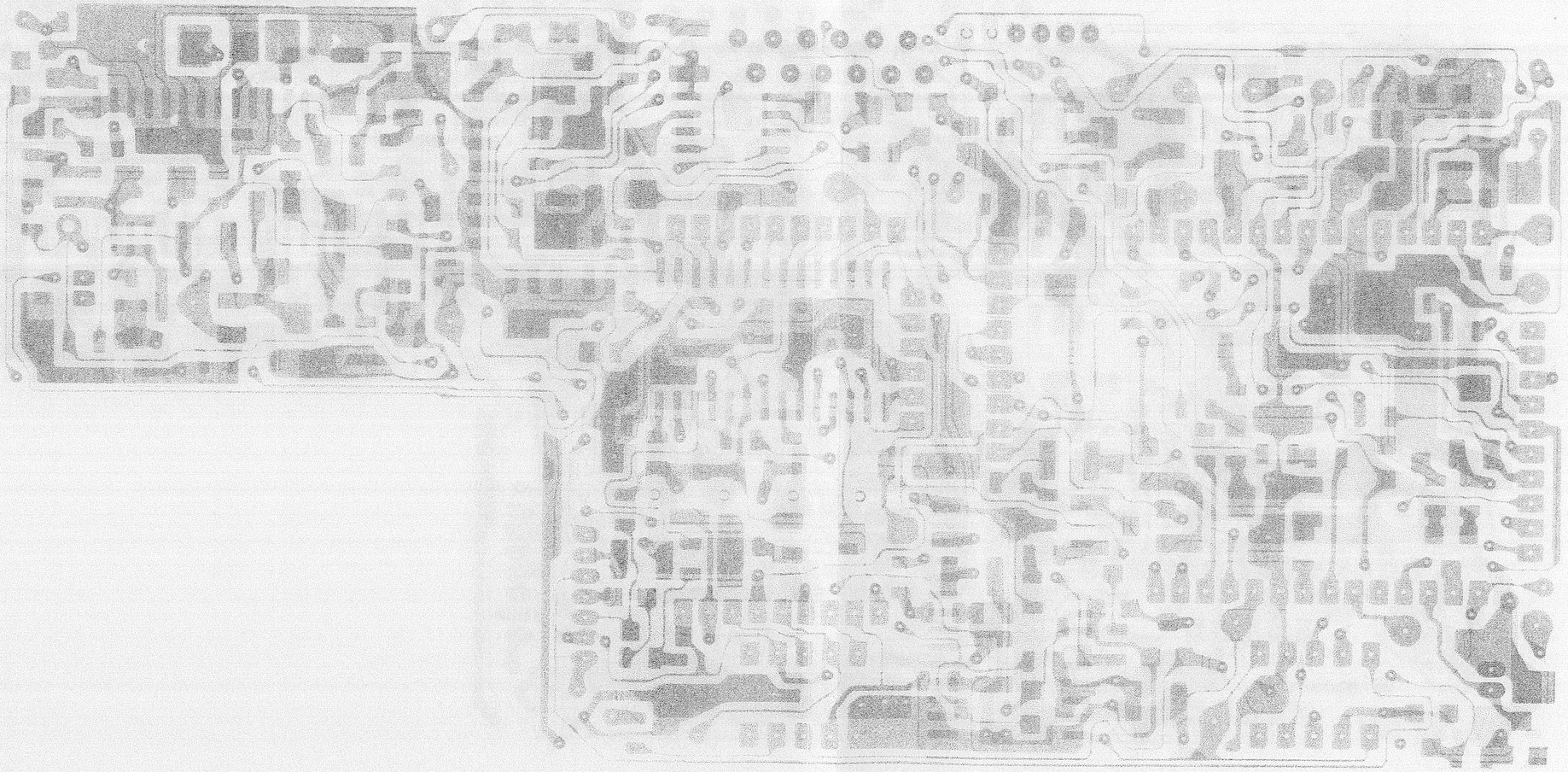


— Rear side —

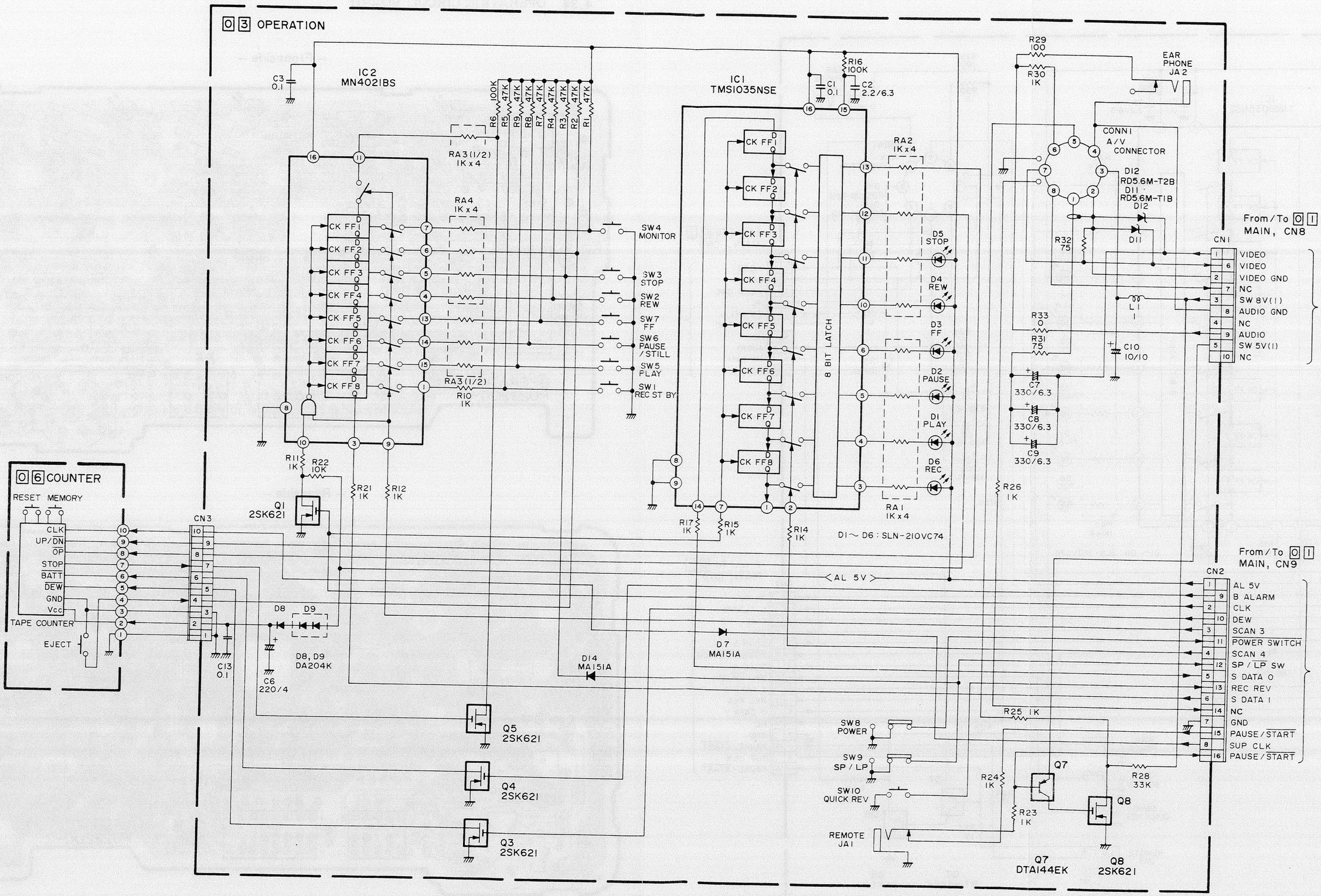


4-44

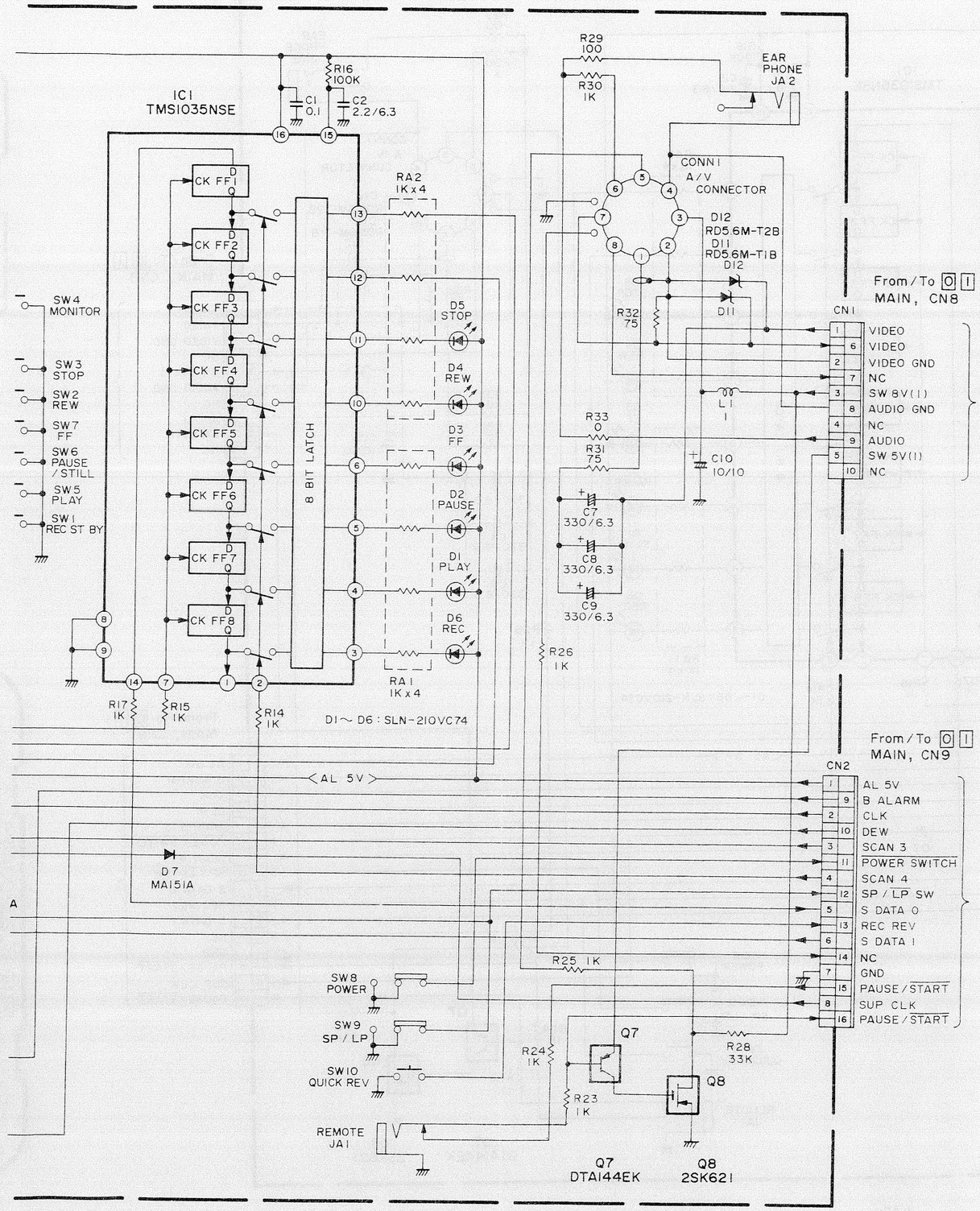




4.33 OPERATION SCHEMATIC DIAGRAM



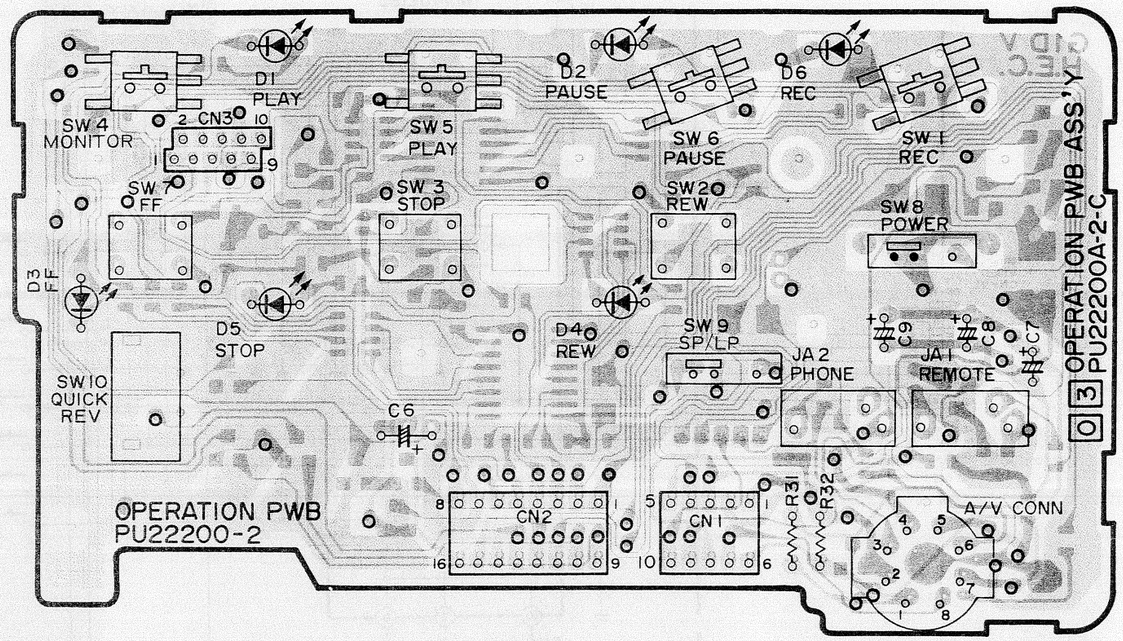
4-45



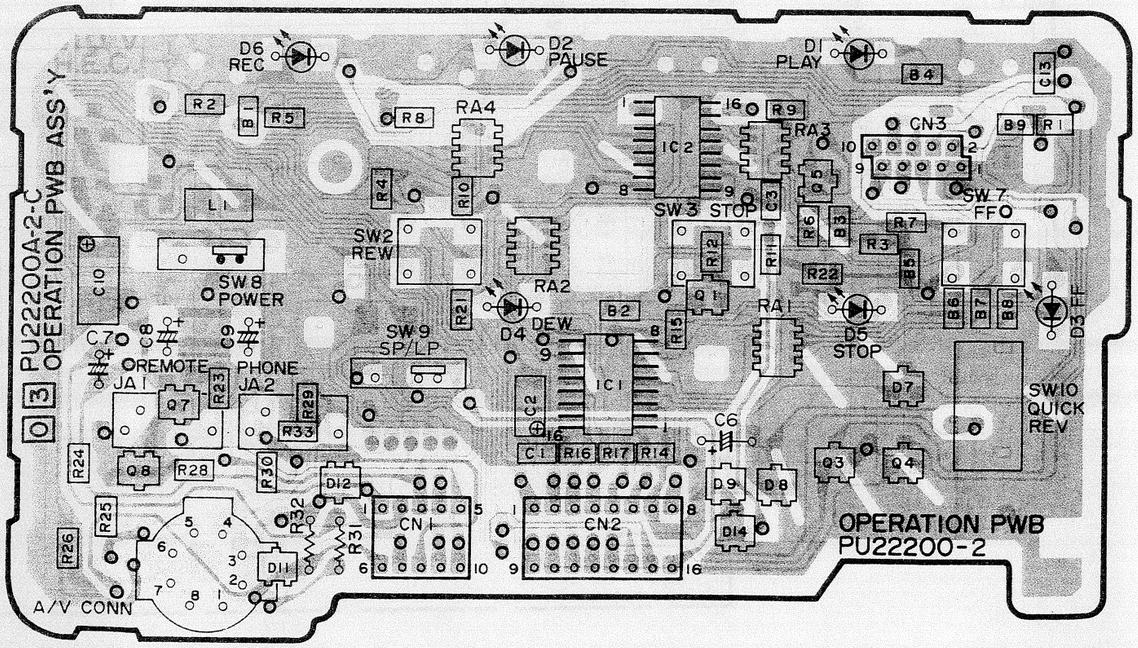
4-45

4.34 OPERATION CIRCUIT BOARD

— Front side —

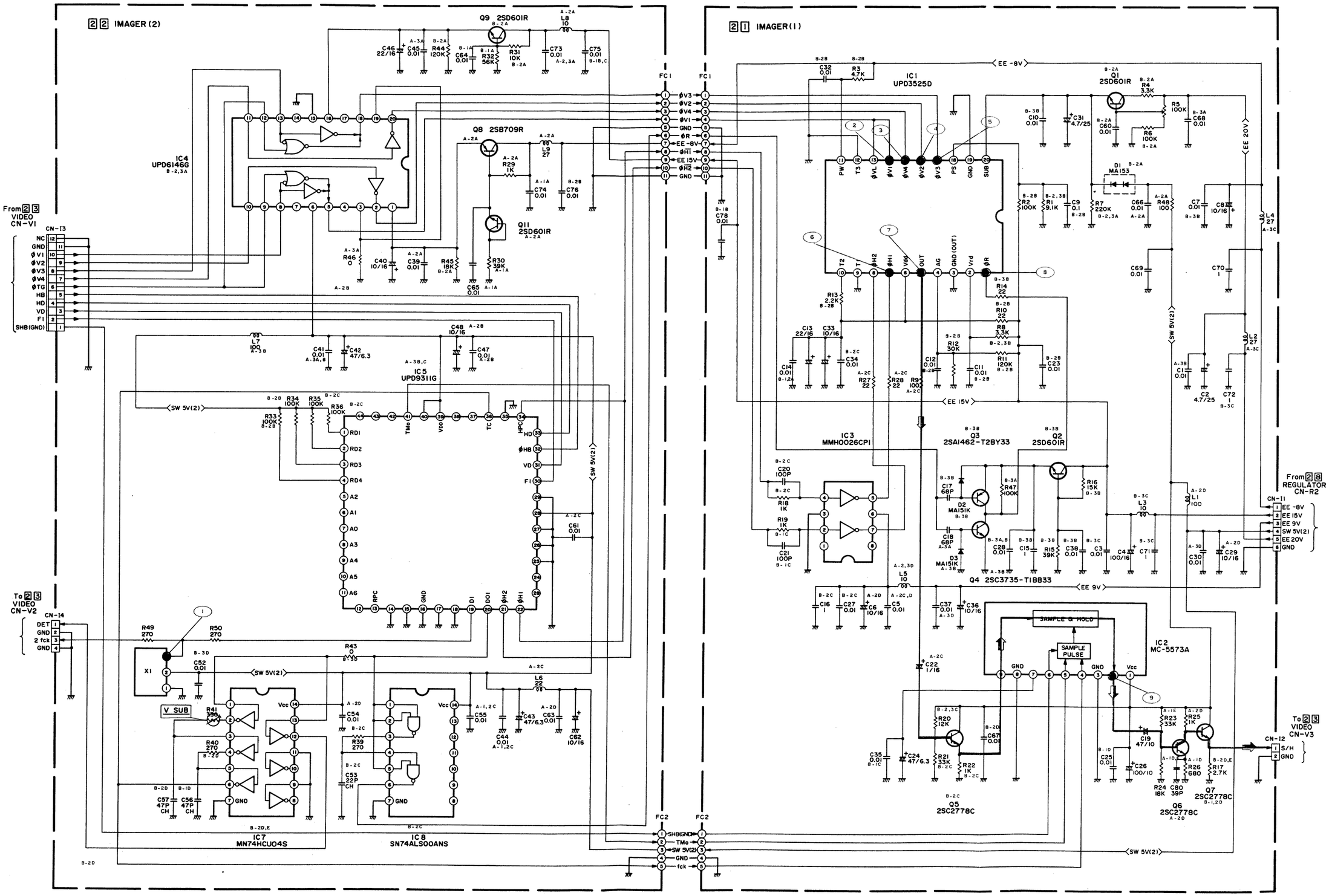


— Rear side —



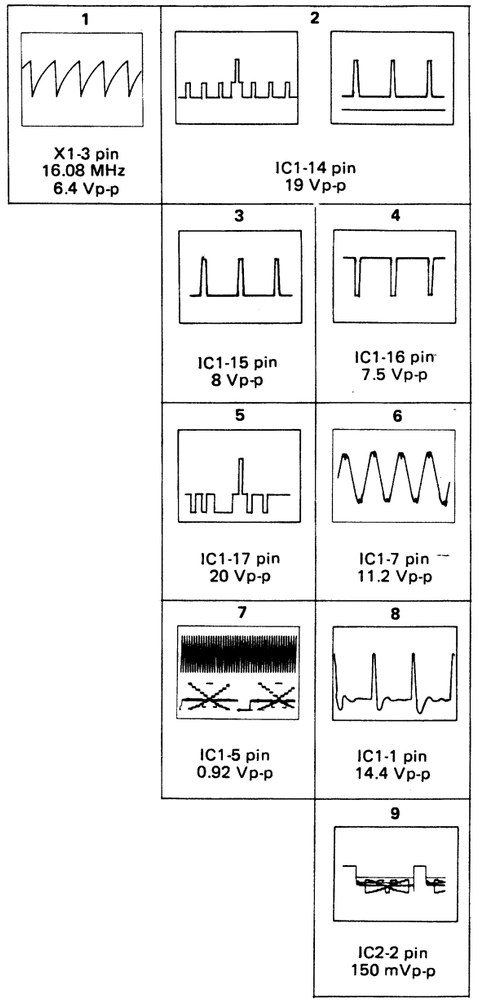
4-45

4.35 IMAGER (1) & (2) SCHEMATIC DIAGRAMS



4-46

— Waveforms of imager circuit —

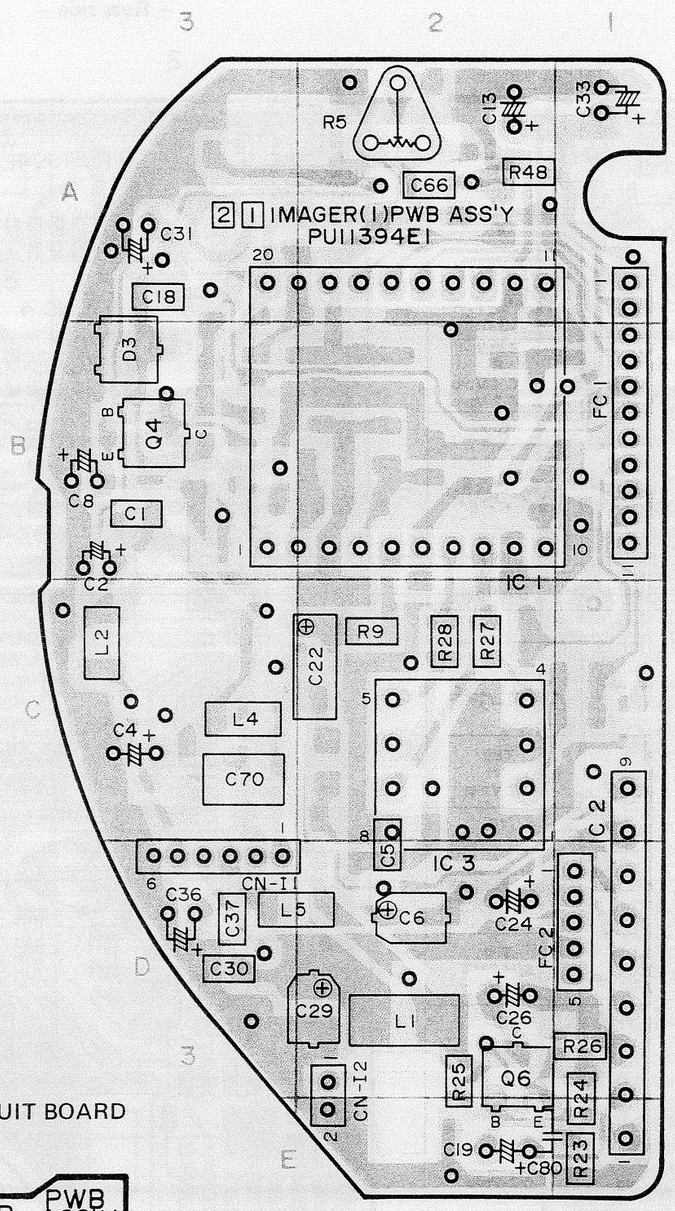


NOTE: Unless otherwise specified.

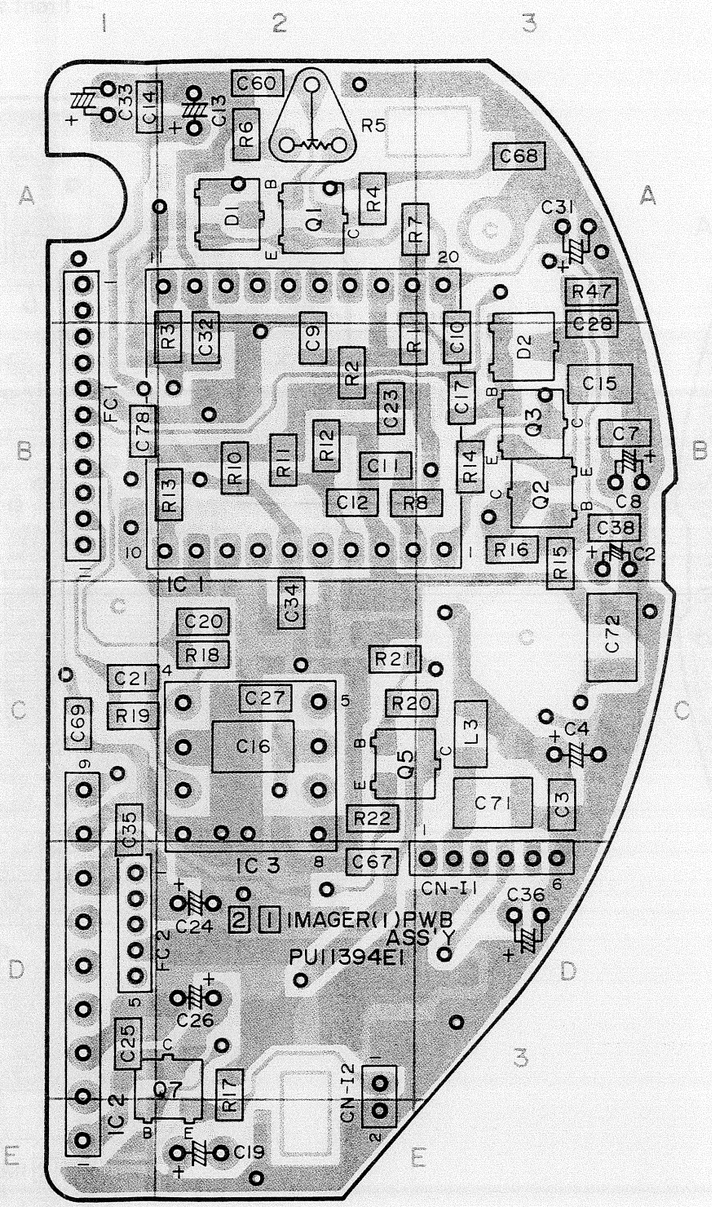
1. Waveform measurements.
   With greyscale completely filling the picture area at EE.

4.36 IMAGER (1) CIRCUIT BOARD

— Front side —

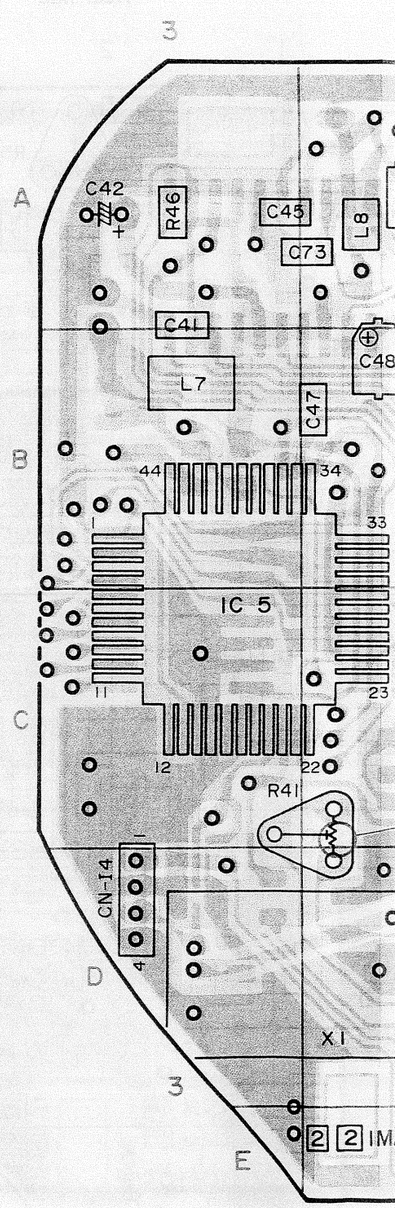


— Rear side —

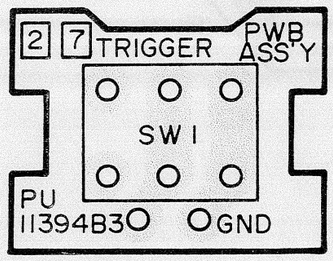


4.37 IMAGER (2) CIRCUIT BOARD

— Front si



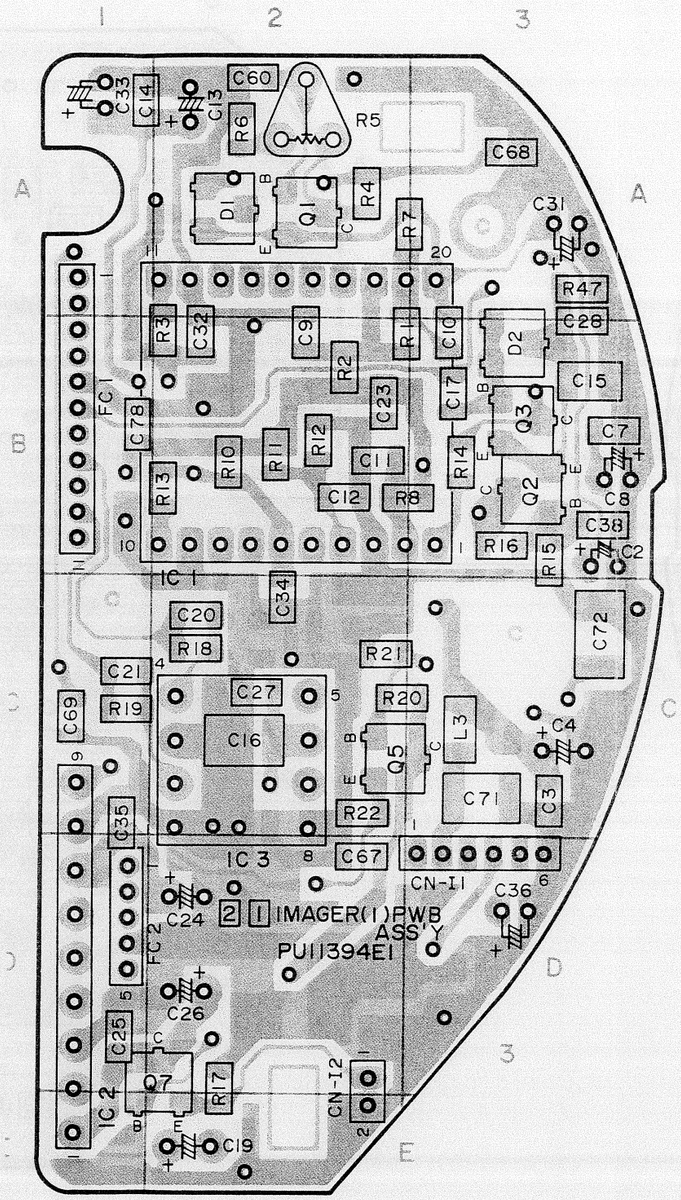
4.38 TRIGGER CIRCUIT BOARD



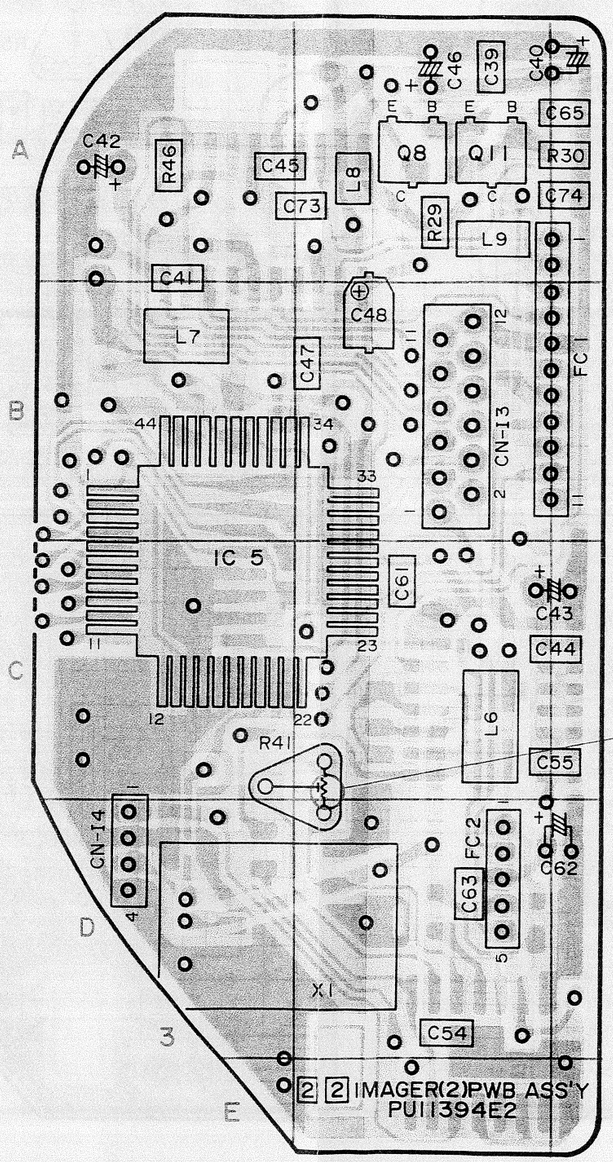
4-47

4.37 IMAGER (2) CIRCUIT BOARD

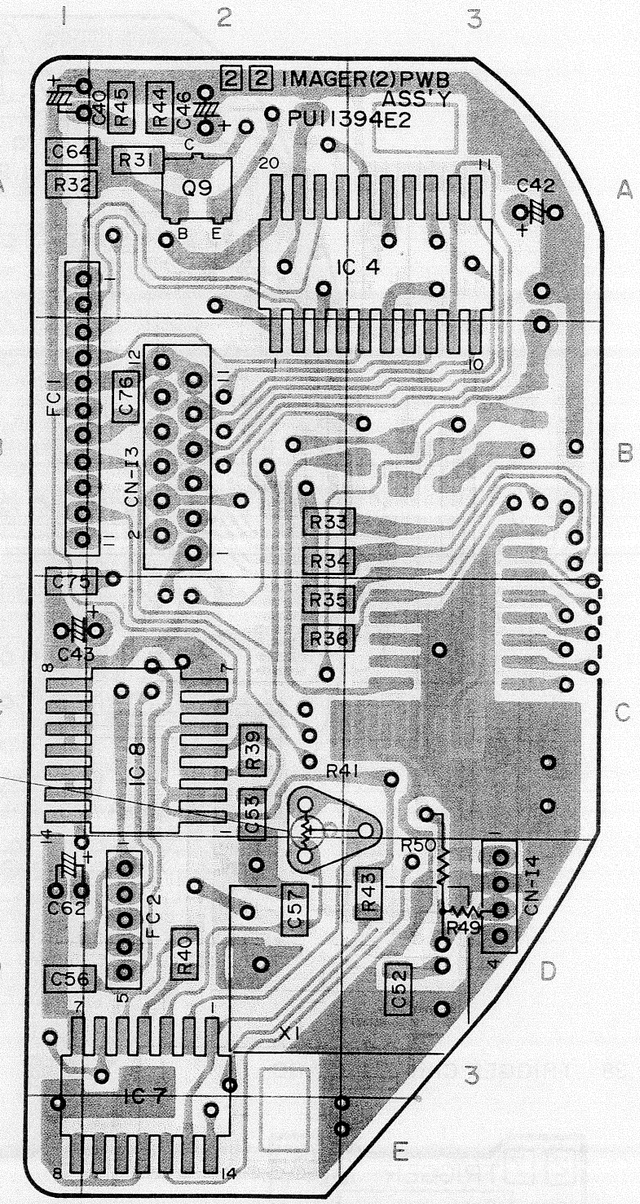
— Rear side —



— Front side —

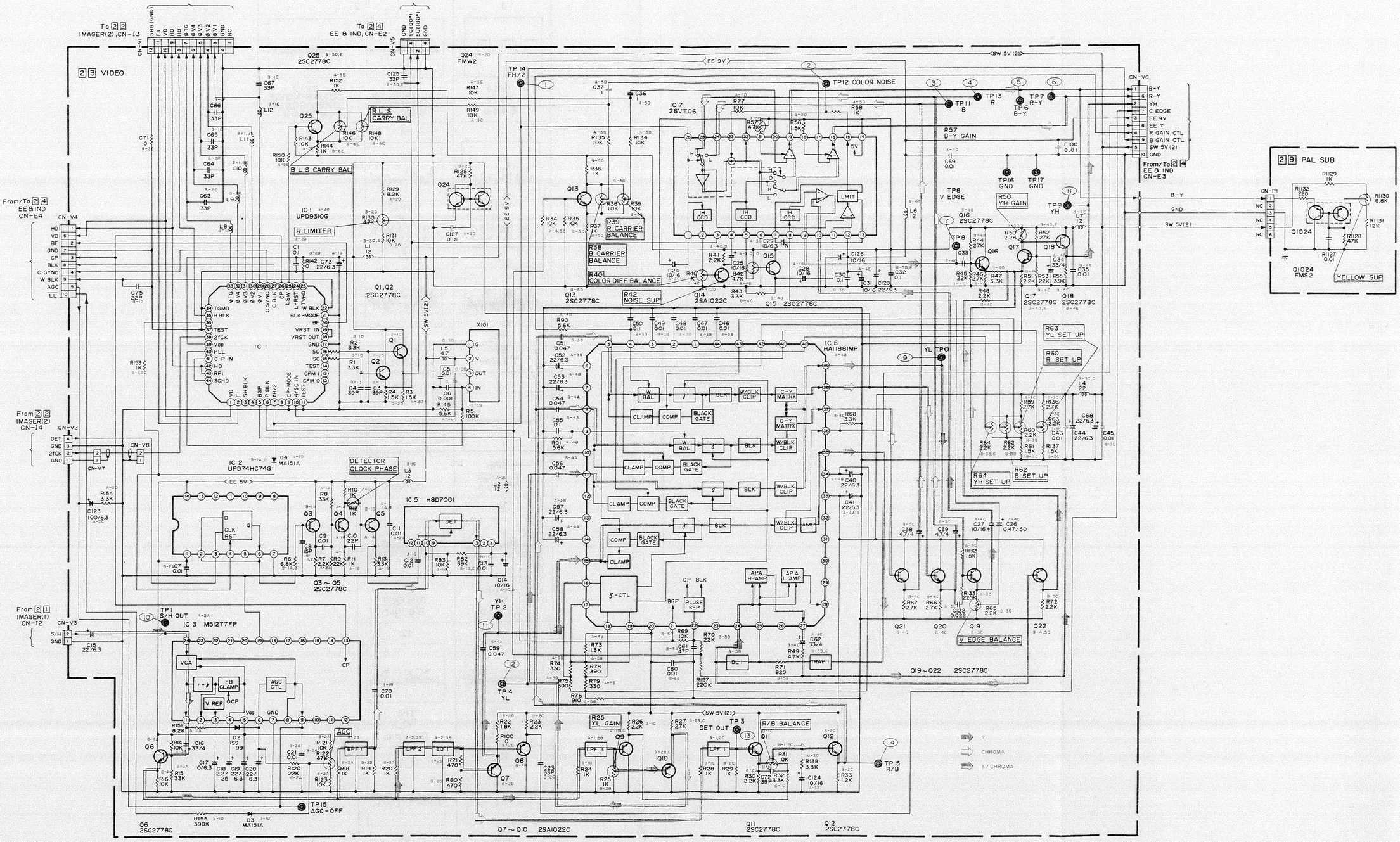


— Rear side —



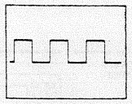
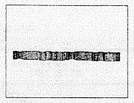
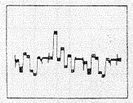
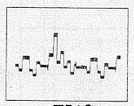
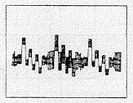
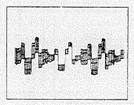
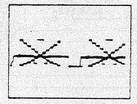
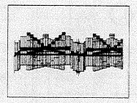
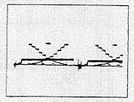
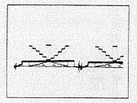
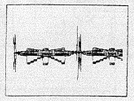
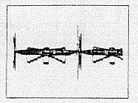
R41
V SUB

4.39 VIDEO SCHEMATIC DIAGRAM



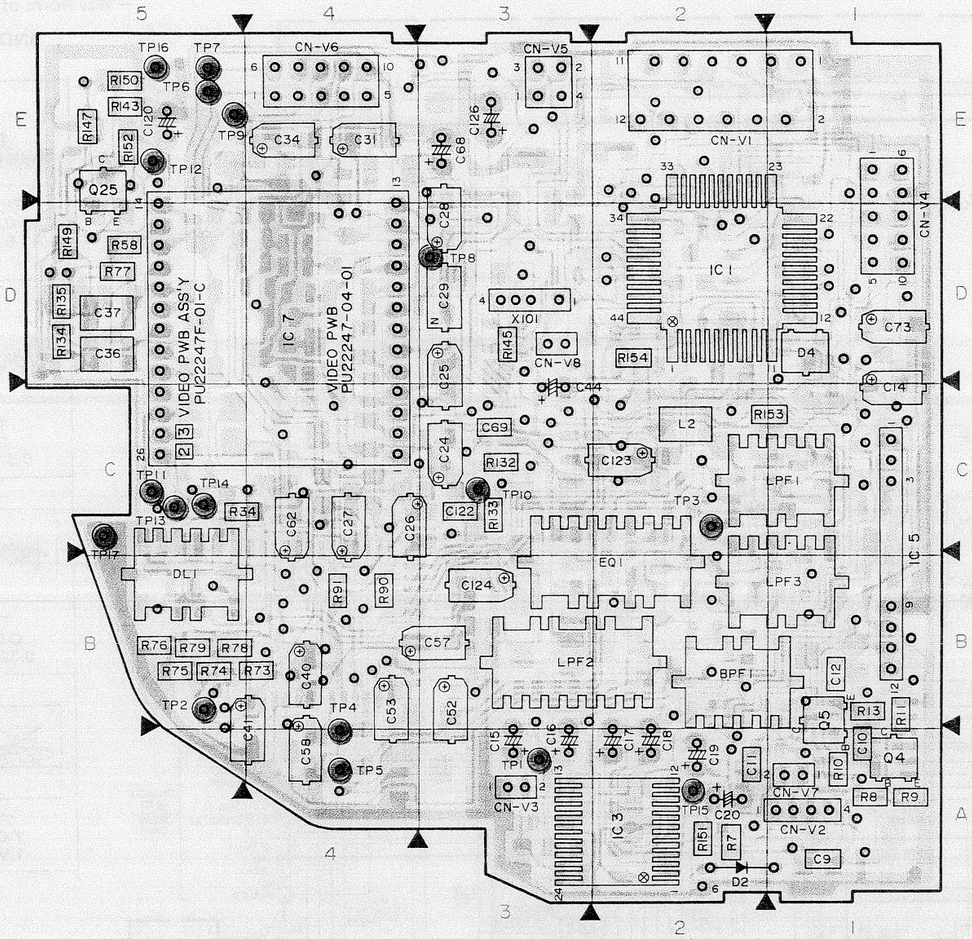
4-48

– Weveform of VIDOE circuit –

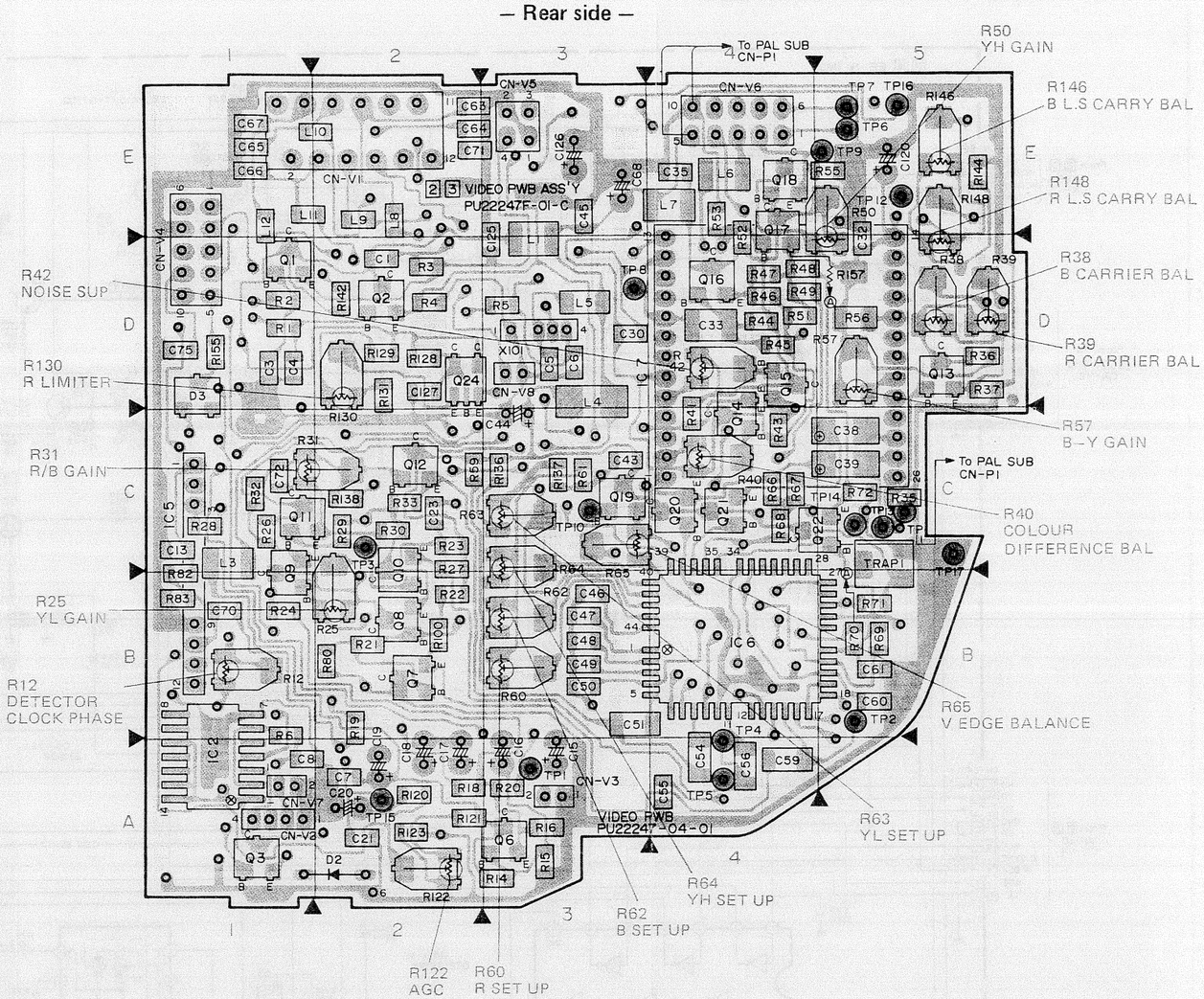
1	2	
		
TP14 FH/2 5 Vp-p	TP12 COLOR NOISE (COLOR BAR) 0.1 Vp-p	TP12 COLOR NOISE (GREY SCALE) 0.1 Vp-p
3	4	
		
TP11 B B 0.8 Vp-p R 0.7 Vp-p	TP13 R R 0.4 Vp-p B 0.2 Vp-p	
5	6	
		
TP6 B-Y 1.4 Vp-p	TP7 R-Y 0.4 Vp-p	
7	8	
		
TP8 V. EDGE 0.2 Vp-p	TP9 YH 0.7 Vp-p	
9	10	
		
TP10 YL 0.8 Vp-p	TP1 S/H QUT 0.6 Vp-p	
11	12	
		
TP2 YH 0.3 Vp-p	TP4 YL 0.2 Vp-p	
13		
		
TP3 DET OUT 0.4 Vp-p	TP5 R/B 0.4 Vp-p	

4.40 VIDEO CIRCUIT BOARD

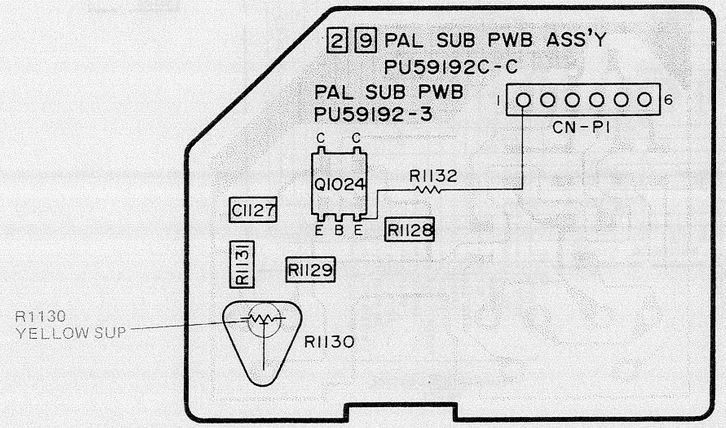
— Front side —



— Rear side —

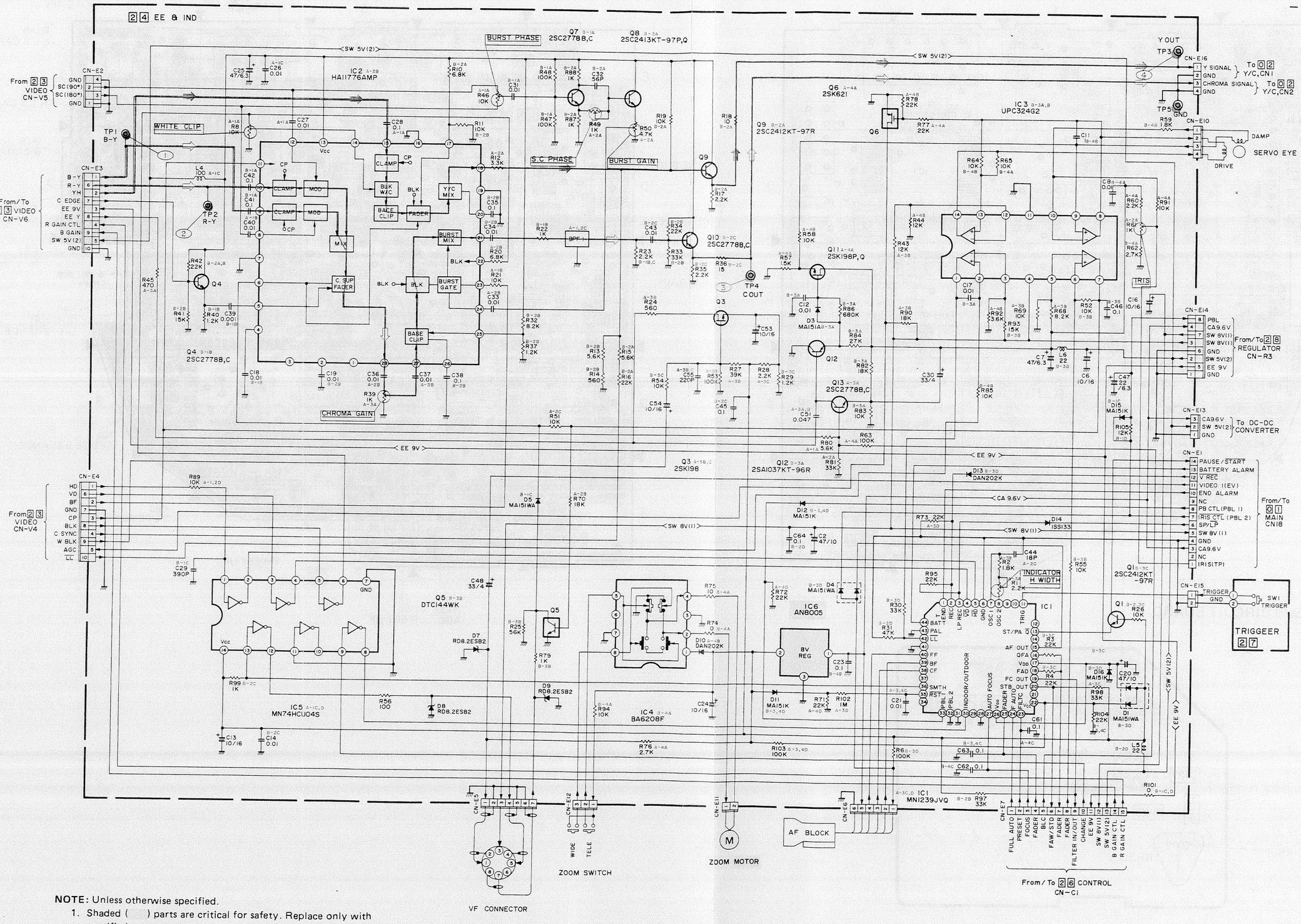


4.41 PAL SUB CIRCUIT BOARD



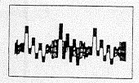
4-49

4.42 EE & IND SCHEMATIC DIAGRAM



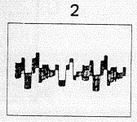
— Waveform of EE & IND circuit —

1



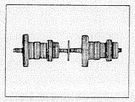
TP1 B-Y
B : 0.41 Vp-p
R : 0.31 Vp-p

2



TP2
R-Y
0.37 Vp-p

3



TP4
C OUT
0.32 Vp-p

4

TP3
Y OUT
1 Vp-p

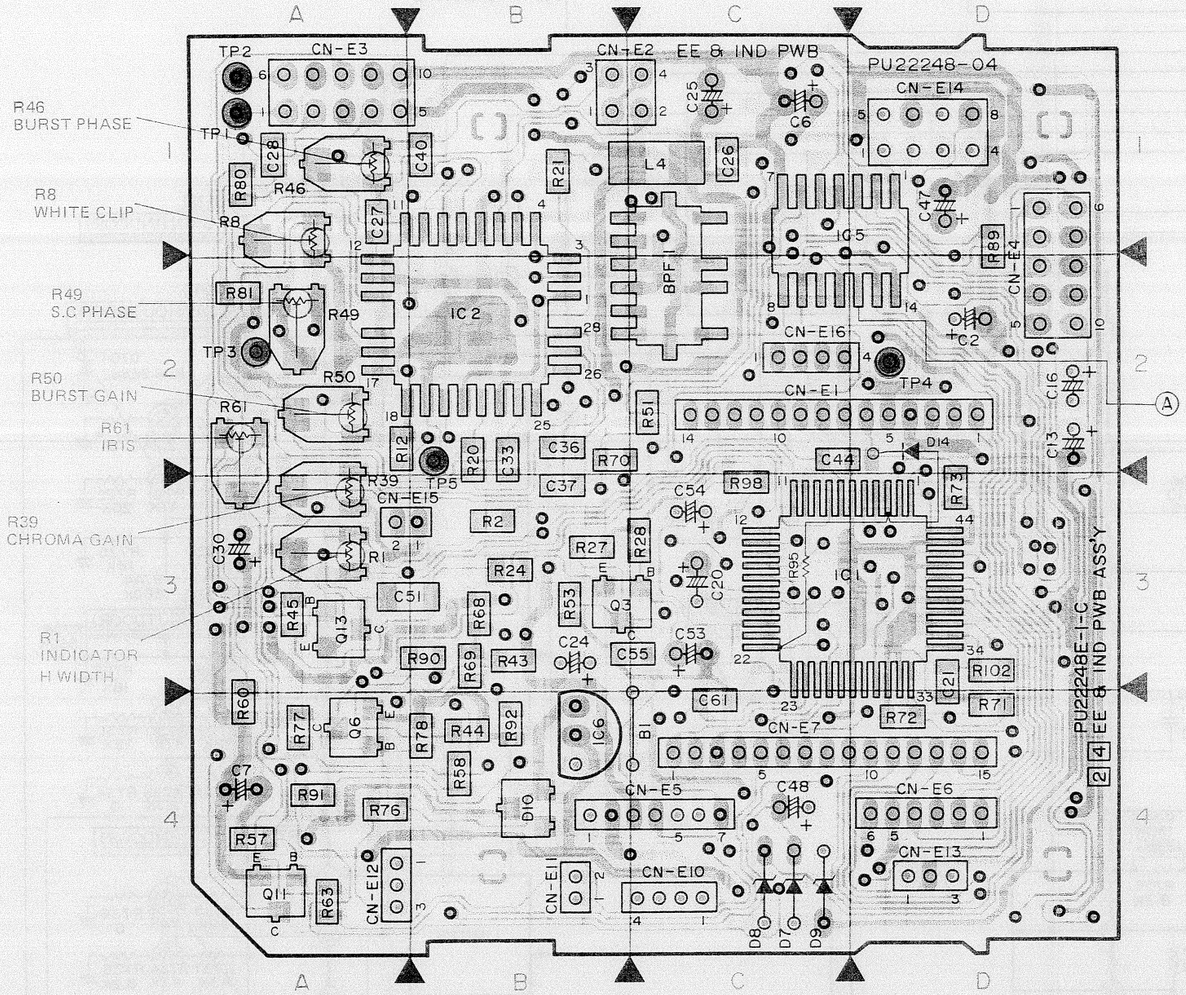
NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

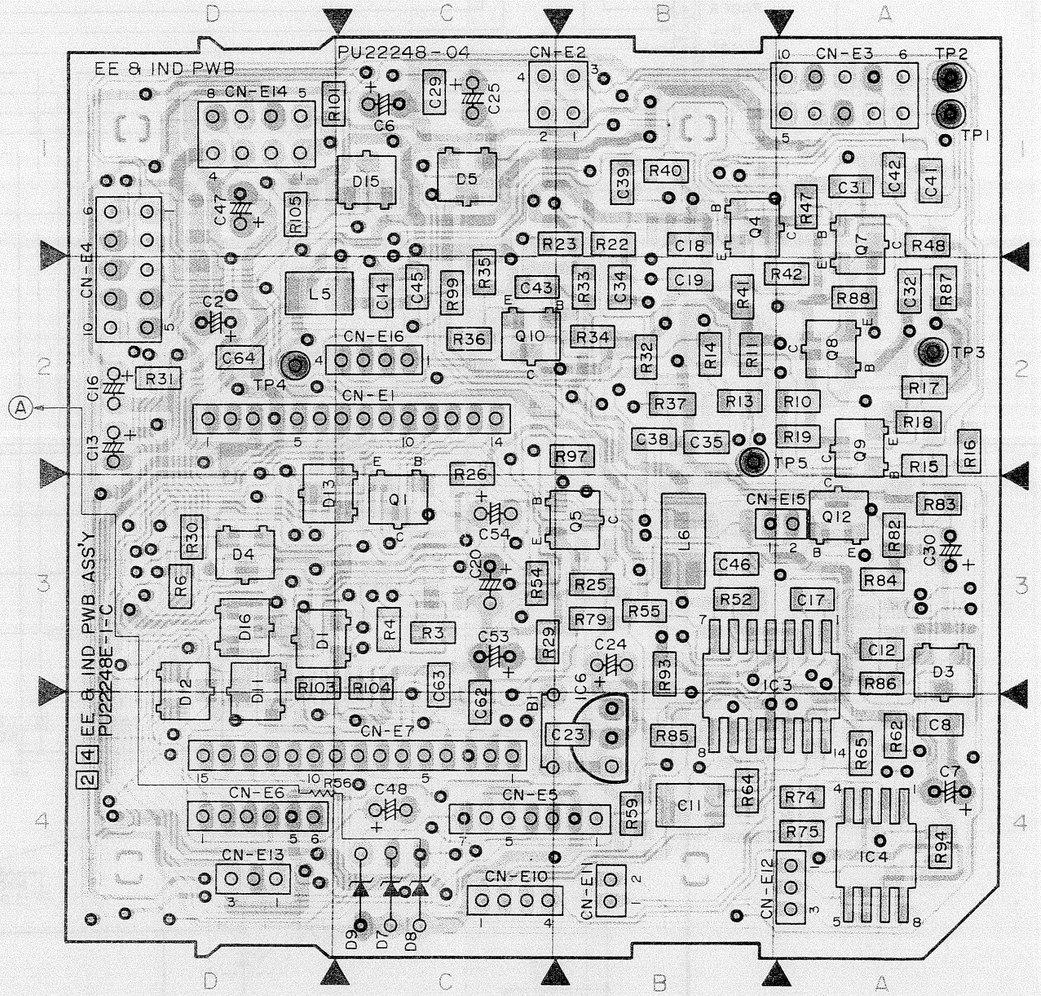
4-50

4.43 EE & IND CIRCUIT BOARD

— Front side —

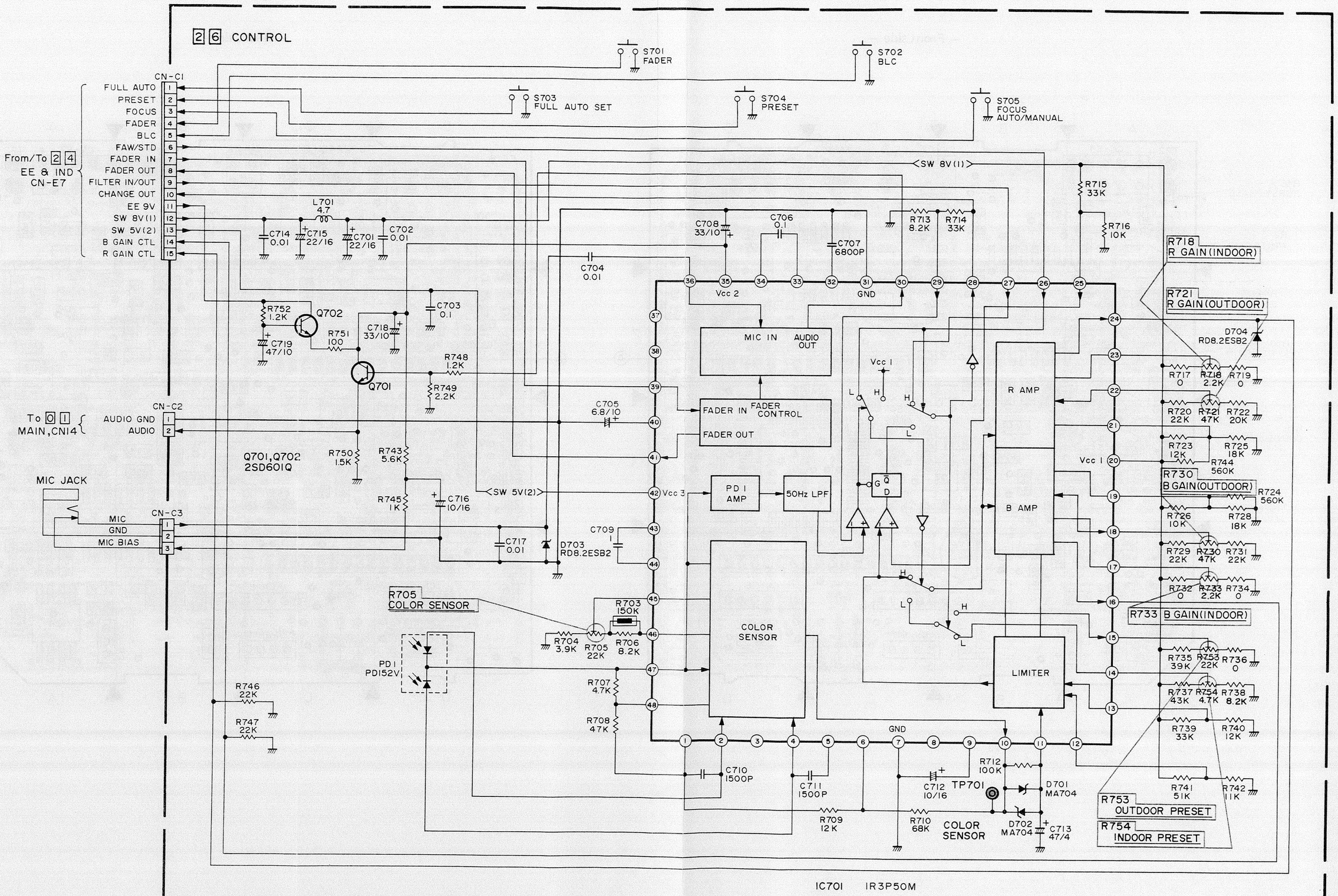


— Rear side —



4-51

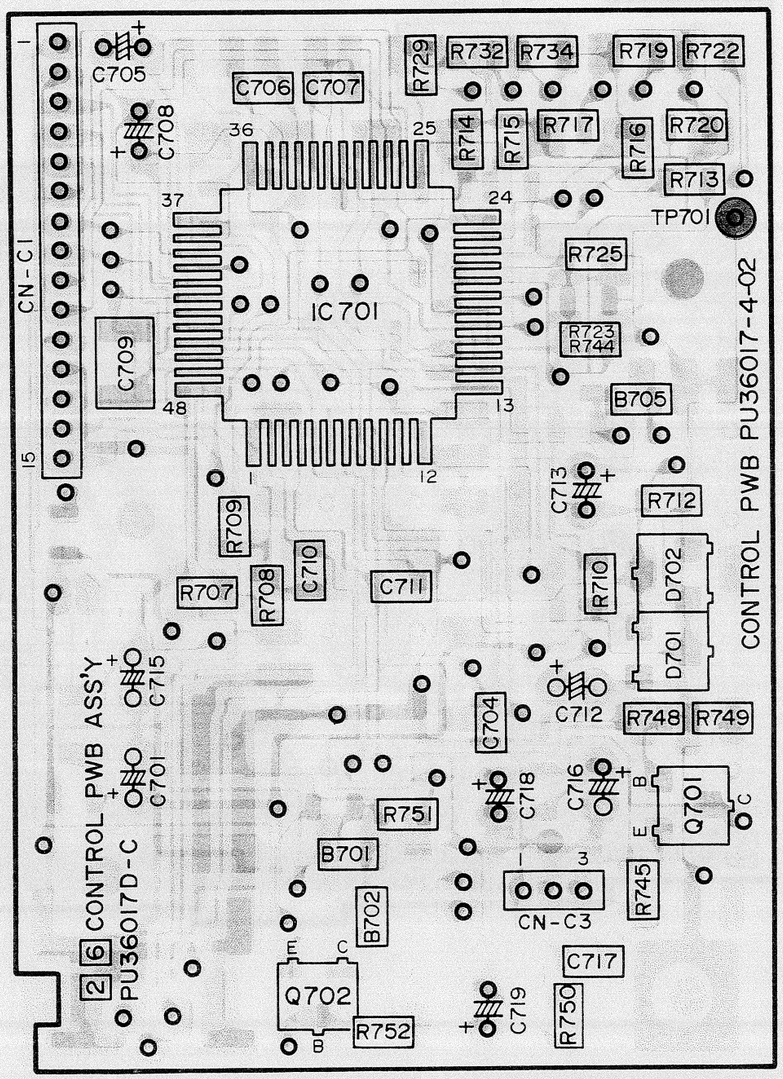
4.44 CONTROL SCHEMATIC DIAGRAM



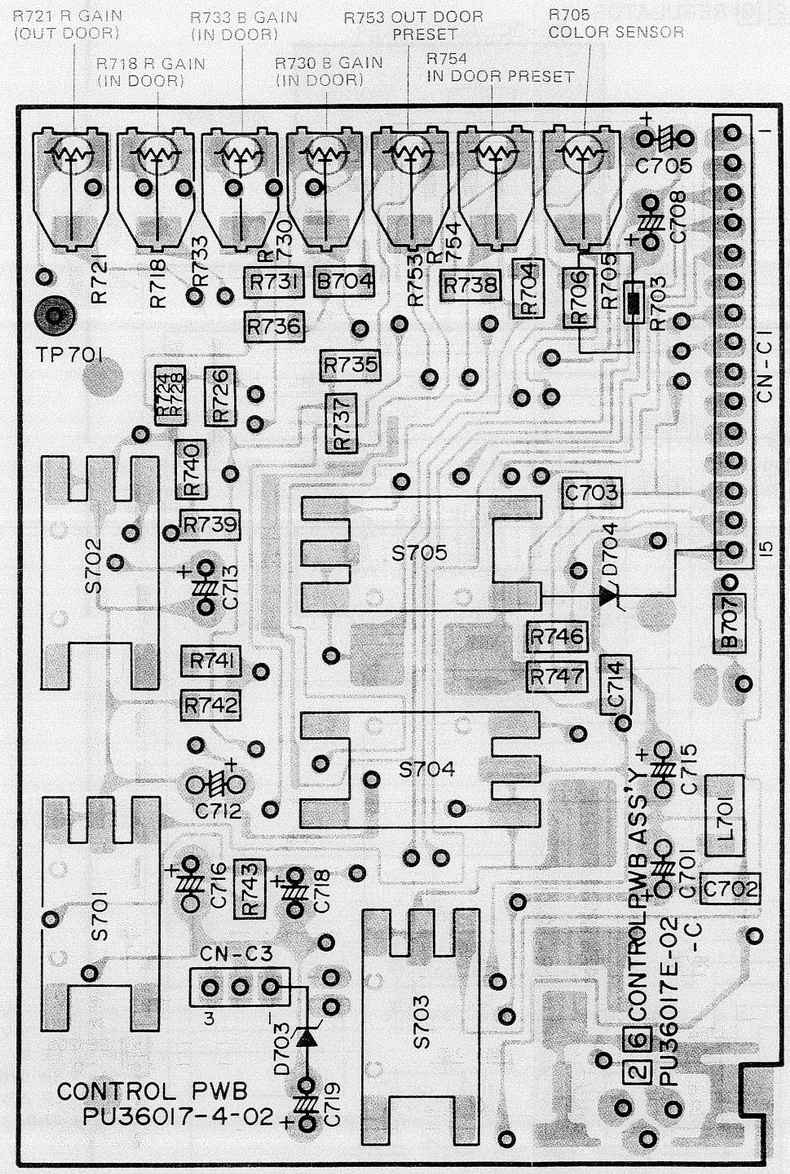
4-52

4.45 CONTROL CIRCUIT BOARD

— Front side —

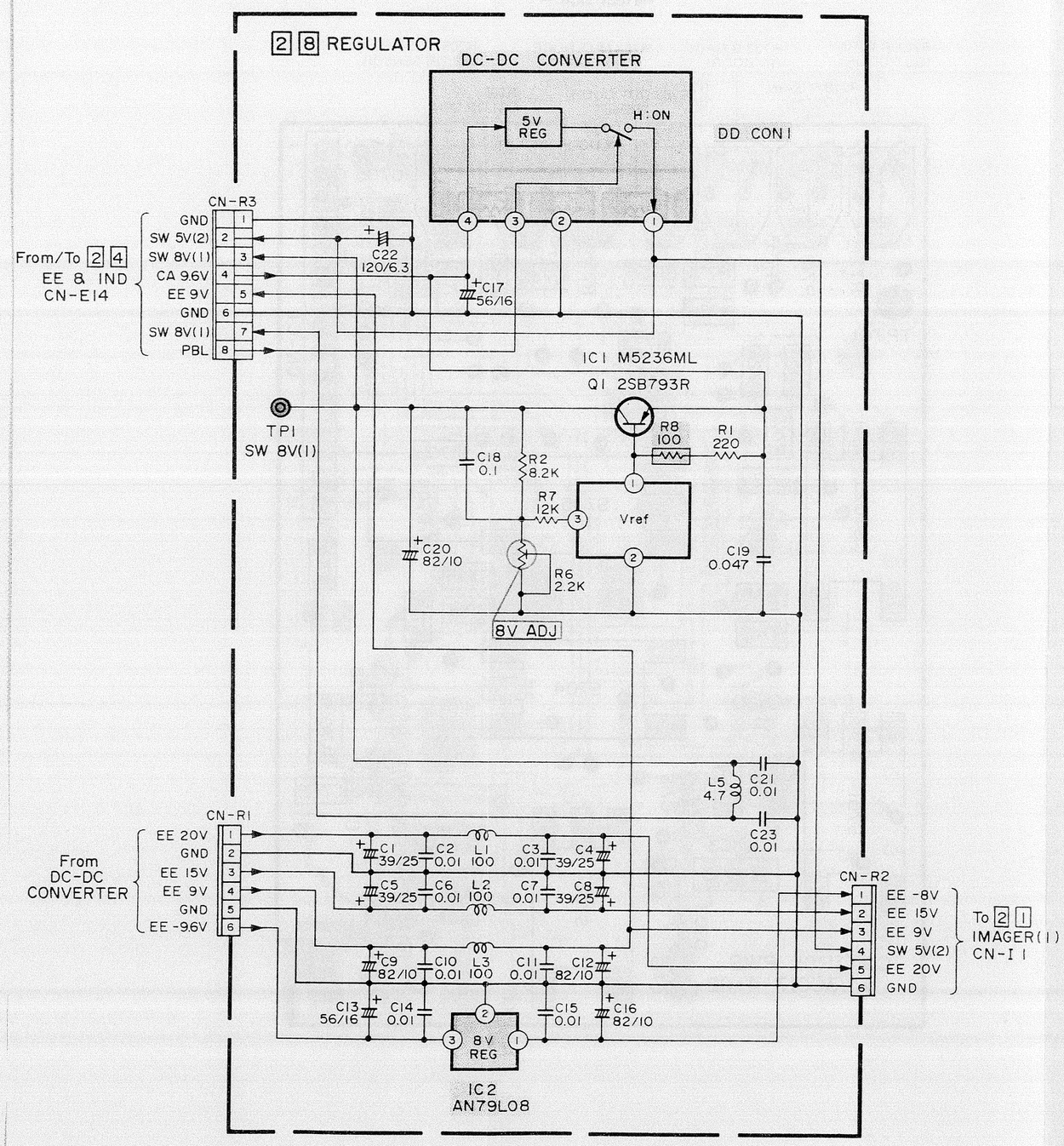


—Rear side —



4-53

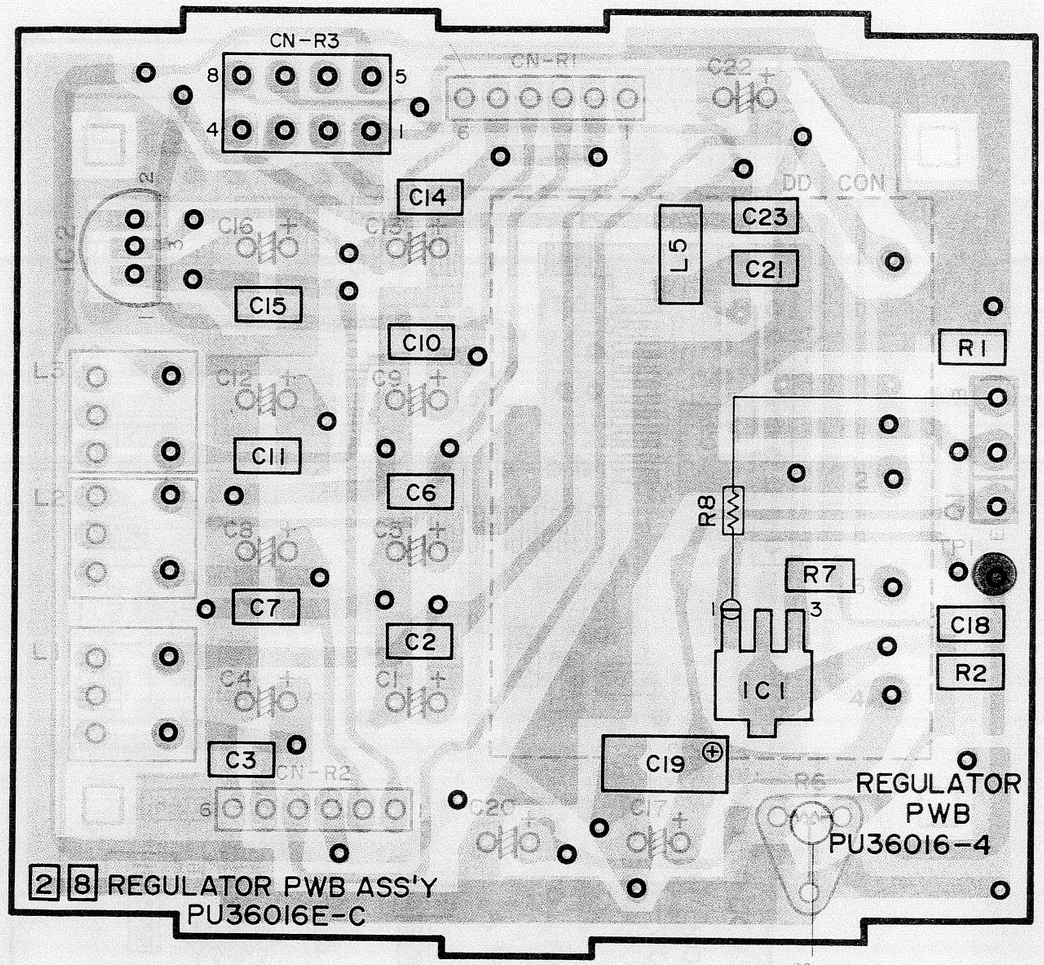
4.46 REGULATOR SCHEMATIC DIAGRAM

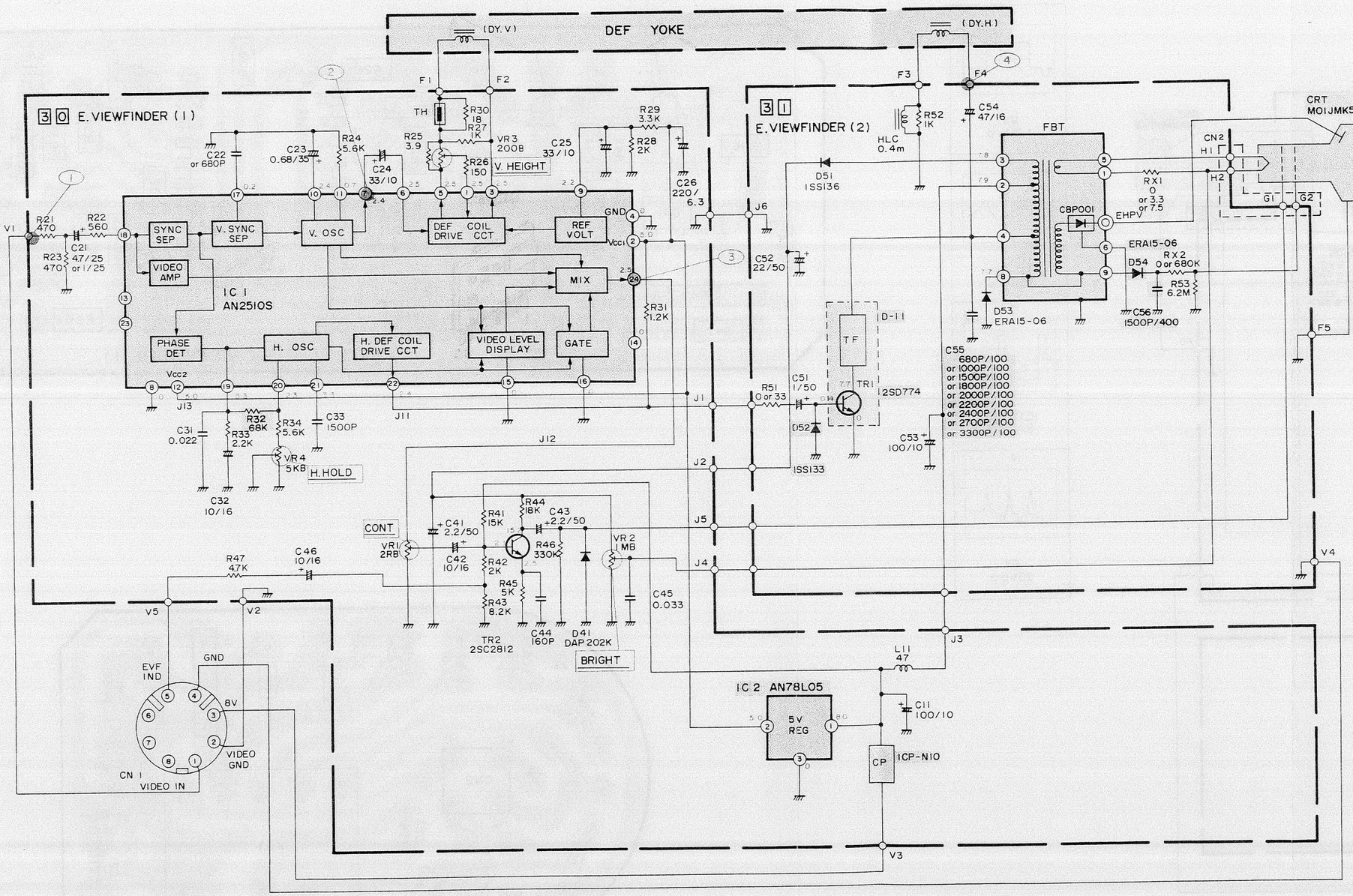


NOTE: Unless otherwise specified.

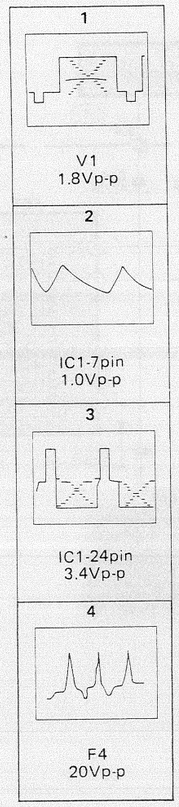
1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4.47 REGULATOR CIRCUIT BOARD





— Waveforms of electronic viewfinder circuit —

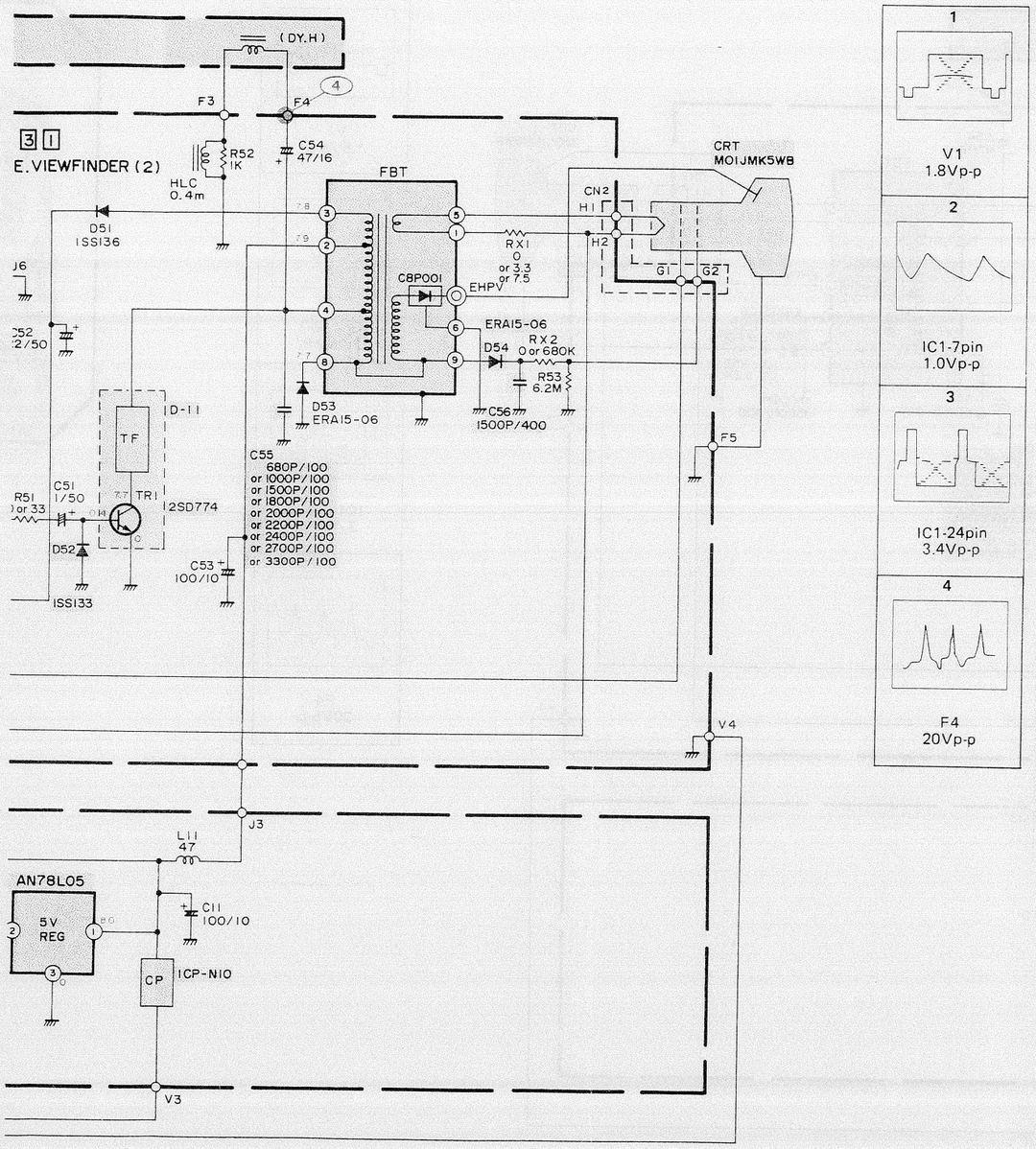


NOTES: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.
2. Voltage and waveform measurements.
   Voltage: Measured with digital voltmeter in DC range at iris closed.
   Waveform: With greyscale completely filling the picture area at auto-iris.

4-55

— Waveforms of electronic viewfinder circuit —

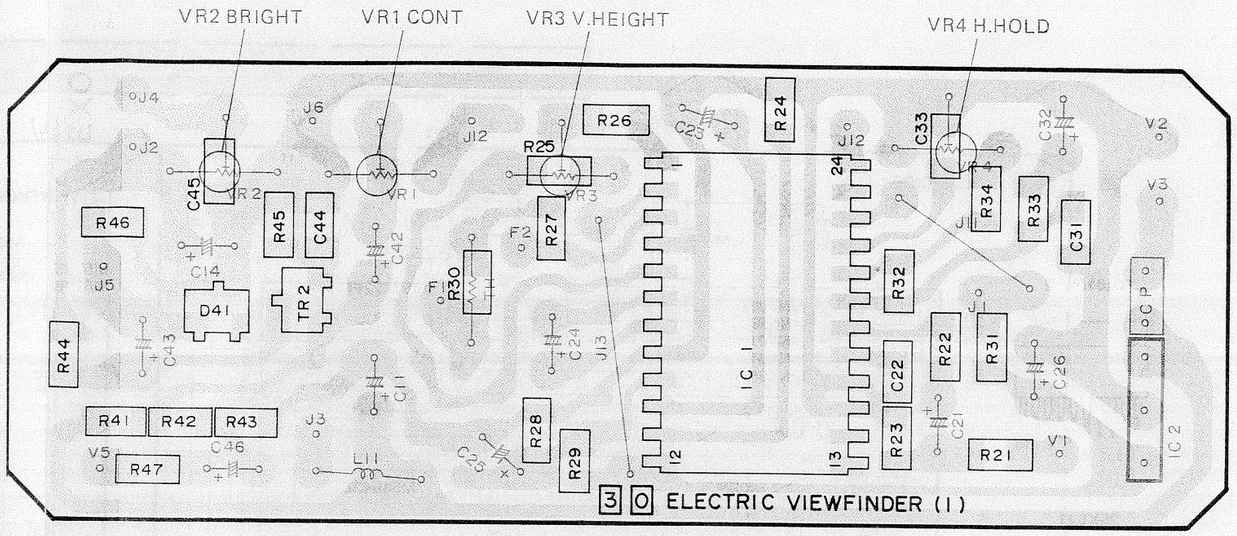


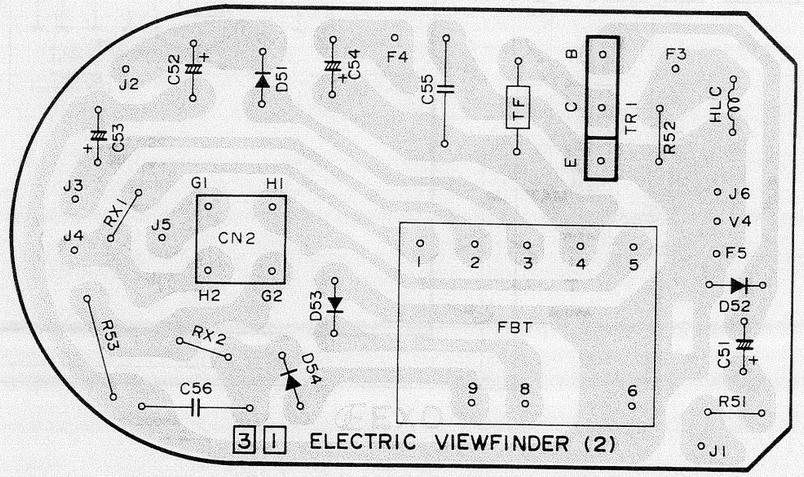
NOTES: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.
2. Voltage and waveform measurements.
   Voltage: Measured with digital voltmeter in DC range at iris closed.
   Waveform: With greyscale completely filling the picture area at auto-iris.

4-55

4.49 ELECTRONIC VIEWFINDER CIRCUIT BOARD



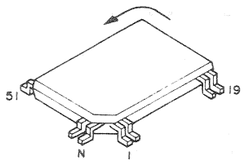


4.50 SEMICONDUCTOR SHAPES

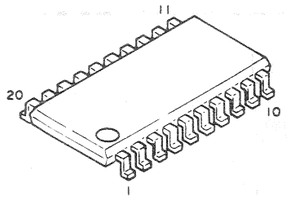
0 1 MAIN

1. MCHACON SECTION

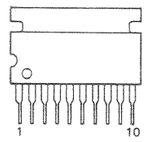
HD6305YOA76F



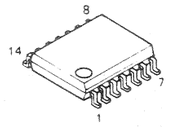
MN74HC244S



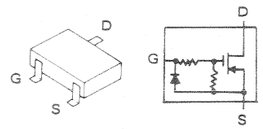
BA6109U2



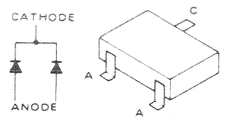
MN4081BS
AN6564NS
MN4071BS
MN4011BS
MN4069UBS



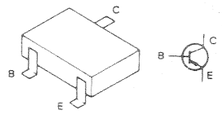
2SK621



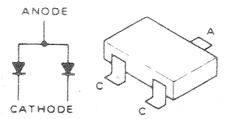
MA151WK



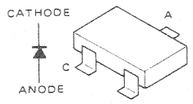
2SB709



MA151WA



MA151A



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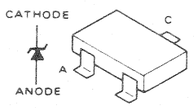

2. SERVO SECTION

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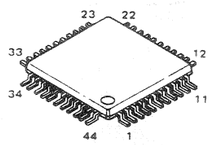

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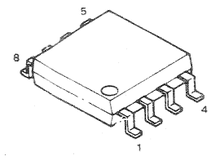

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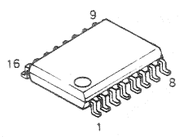

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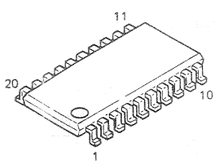

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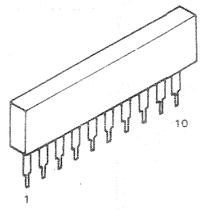

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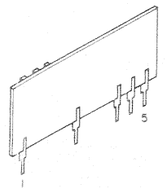

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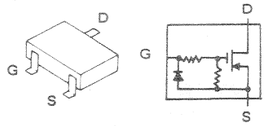

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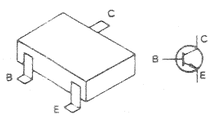

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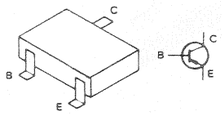

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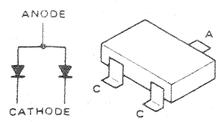

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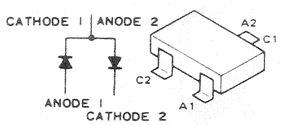
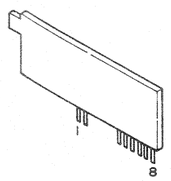


PU22441A-2-C



3. AUDIO SECTION

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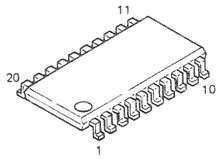

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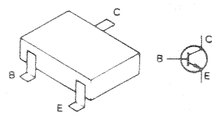

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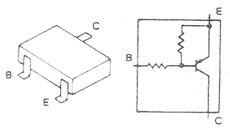

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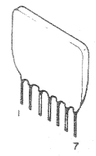

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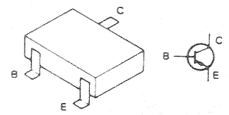

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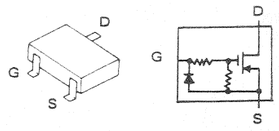
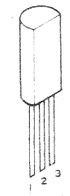
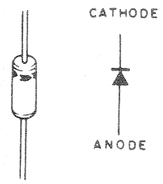


4. REGULATOR SECTION

S-81250AG



ERA81-004



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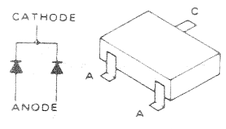

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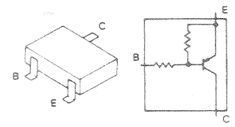

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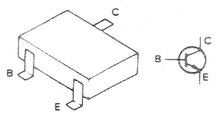

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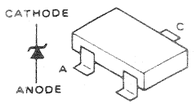

TRACK SHIFT

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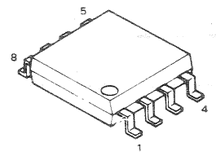

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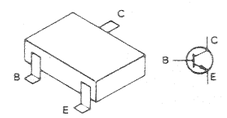

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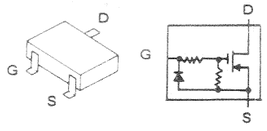

4-56

3. AUDIO SECTION

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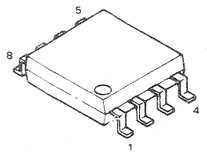

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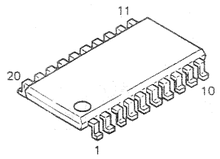

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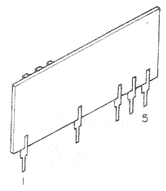

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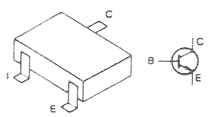

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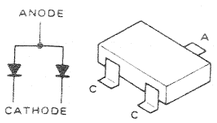
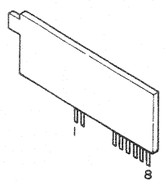


PU22441A-2-C



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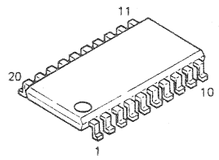

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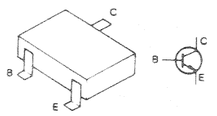

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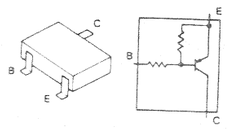

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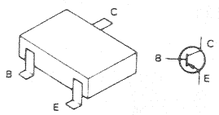

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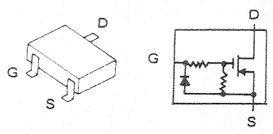
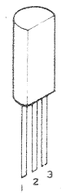
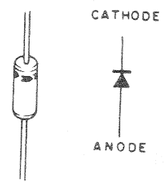


4. REGULATOR SECTION

S-81250AG



ERA81-004



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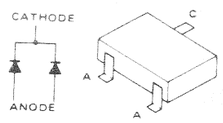

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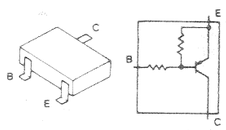

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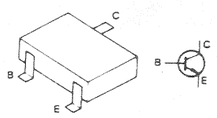

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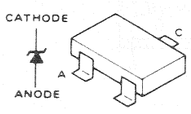

TRACK SHIFT

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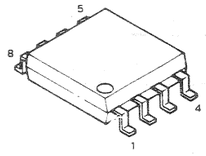

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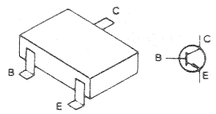

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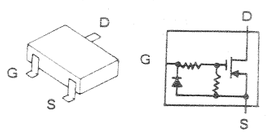

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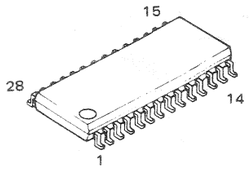

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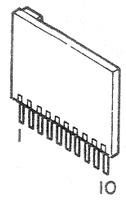

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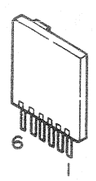

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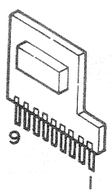

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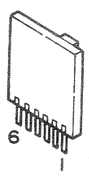

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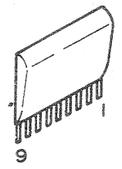

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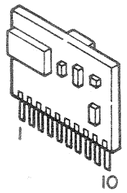

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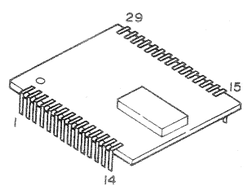

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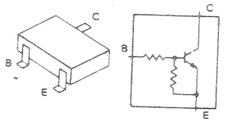

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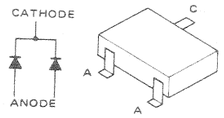

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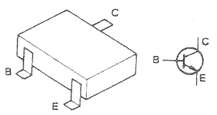

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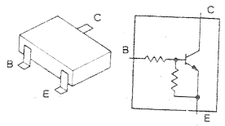

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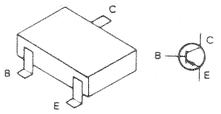

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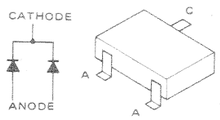

4-56

03 OPERATION

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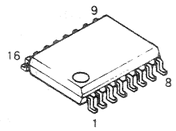

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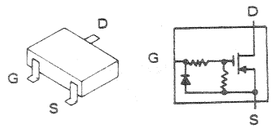

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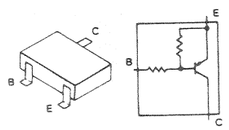

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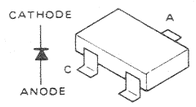

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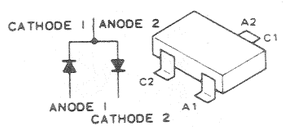

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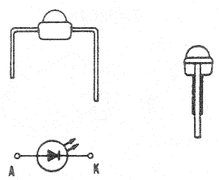

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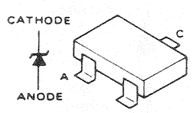

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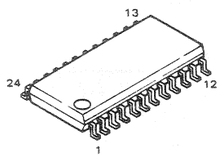

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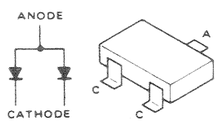

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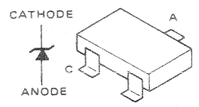

12 SKEW JUMP

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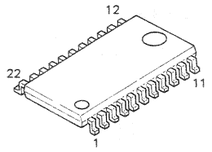

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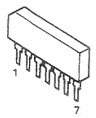

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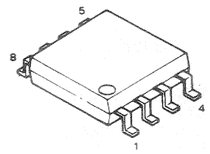

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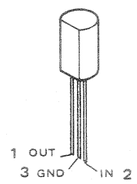

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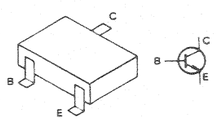

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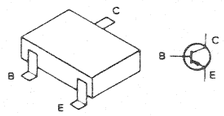

13 END ALARM

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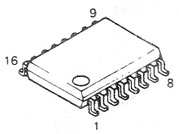

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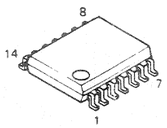

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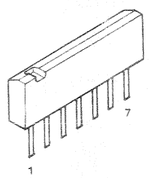

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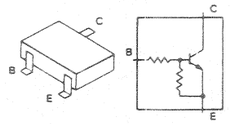

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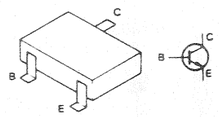

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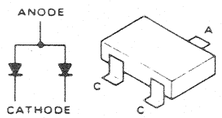

21 IMAGER (1)

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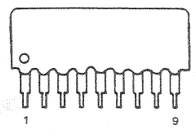

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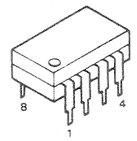

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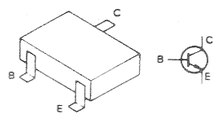

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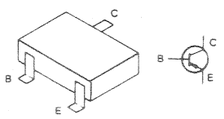

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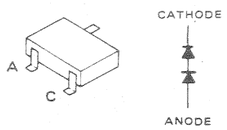

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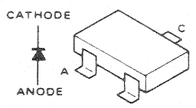

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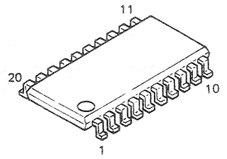

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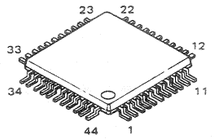

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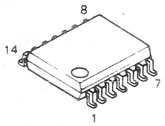

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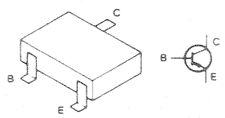

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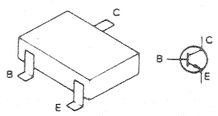

23 VIDEO

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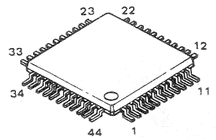

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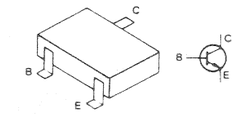

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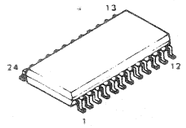

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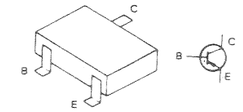

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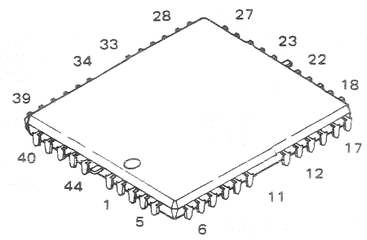

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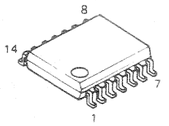

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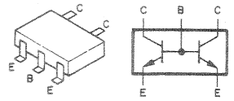

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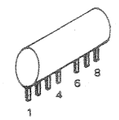

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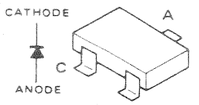

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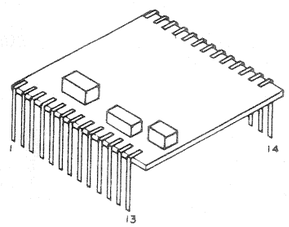

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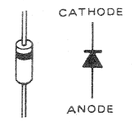

4-57

24 EE & IND

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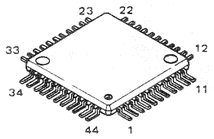

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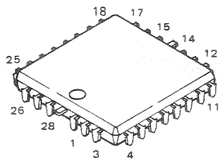

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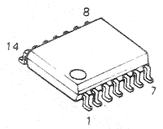

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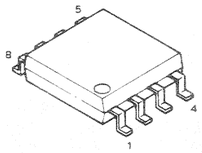

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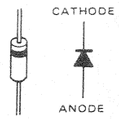

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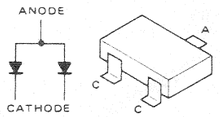

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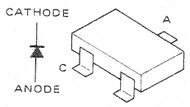

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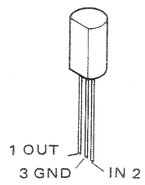

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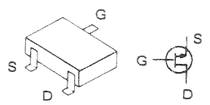

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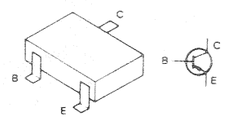

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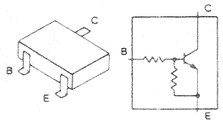

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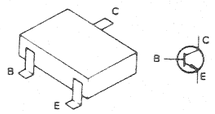

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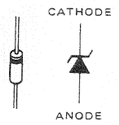

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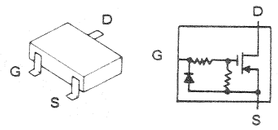

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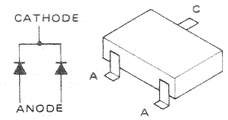

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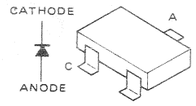

26 CONTROL

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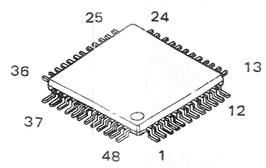

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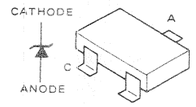

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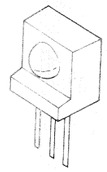

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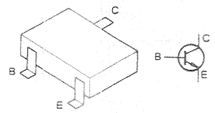

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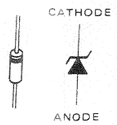
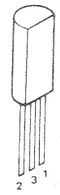


28 REGULATOR

M5236ML

AN79L08



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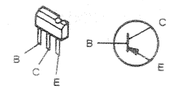

29 PAL SUB

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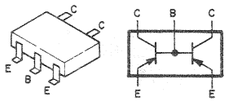
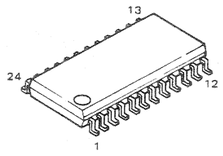


30 ELECTRONIC VIEWFINDER (1)
31 ELECTRONIC VIEWFINDER (2)

AN2510S



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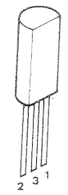

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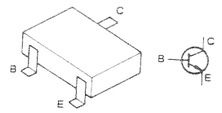

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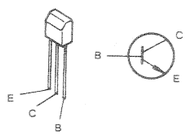

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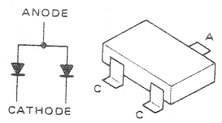

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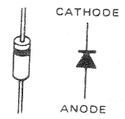
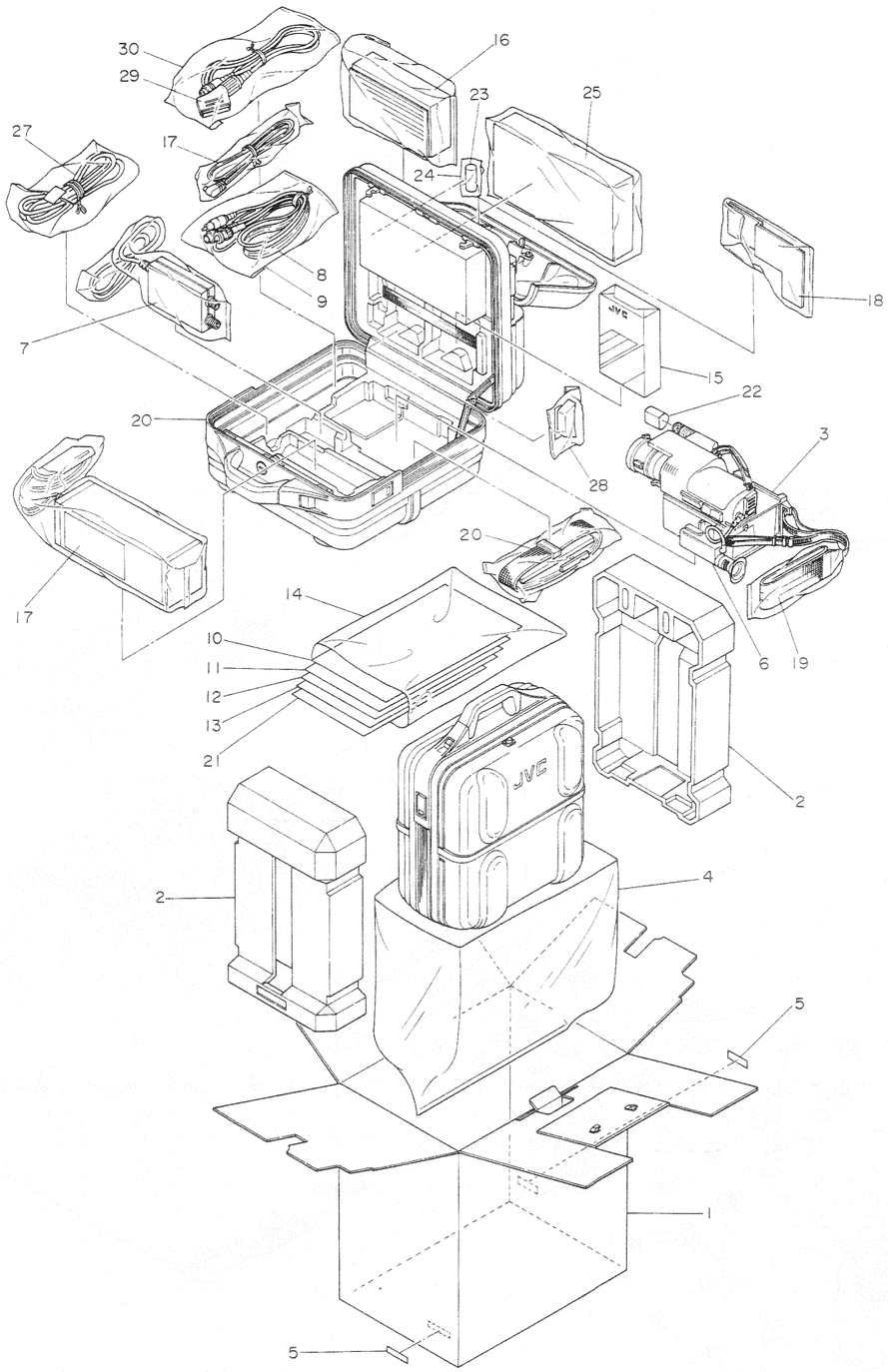
1SS136
ERA15-06



4-58

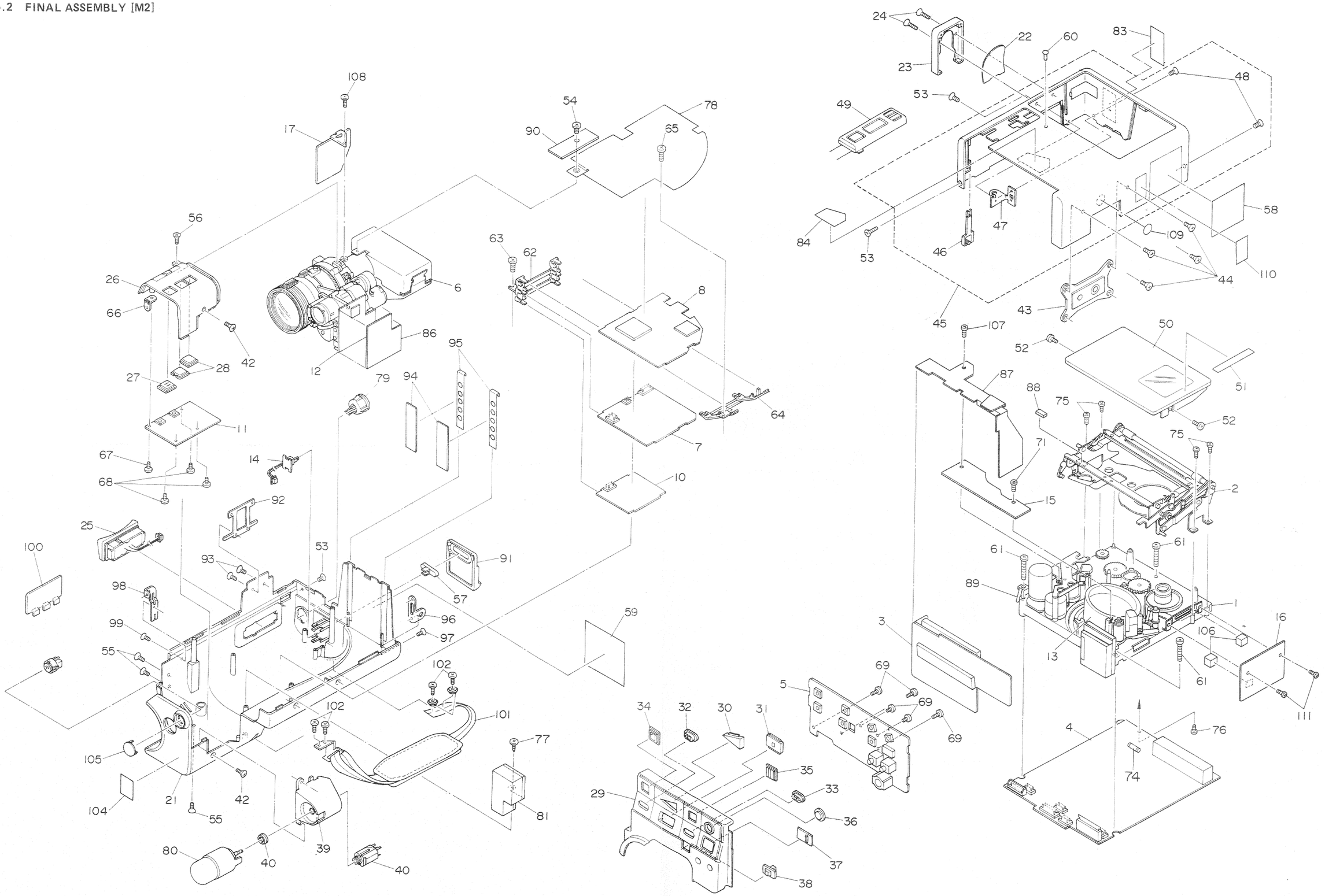
SECTION 5
EXPLODED VIEWS

5.1 PACKING AND ACCESSORIES [M1]

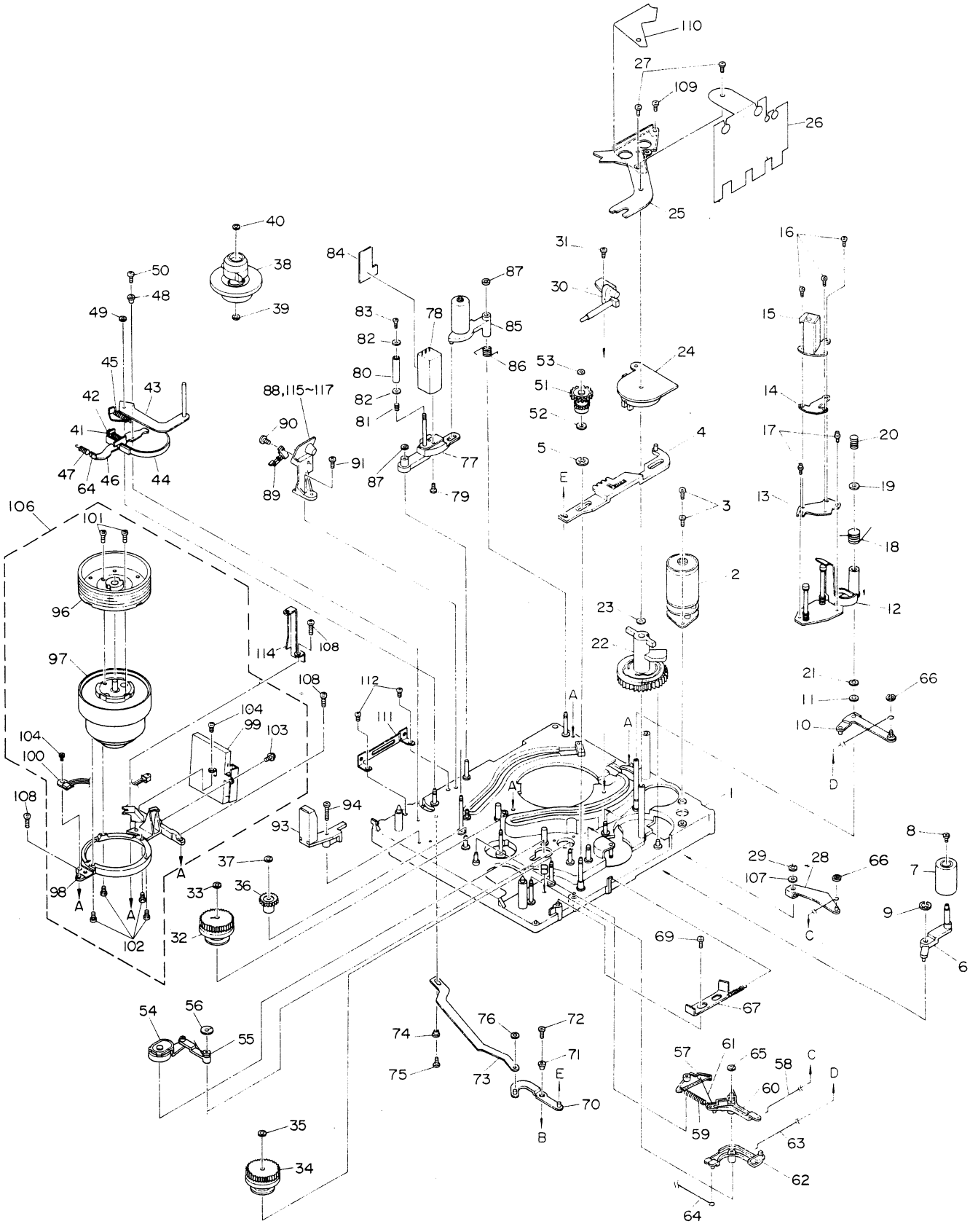


5-1

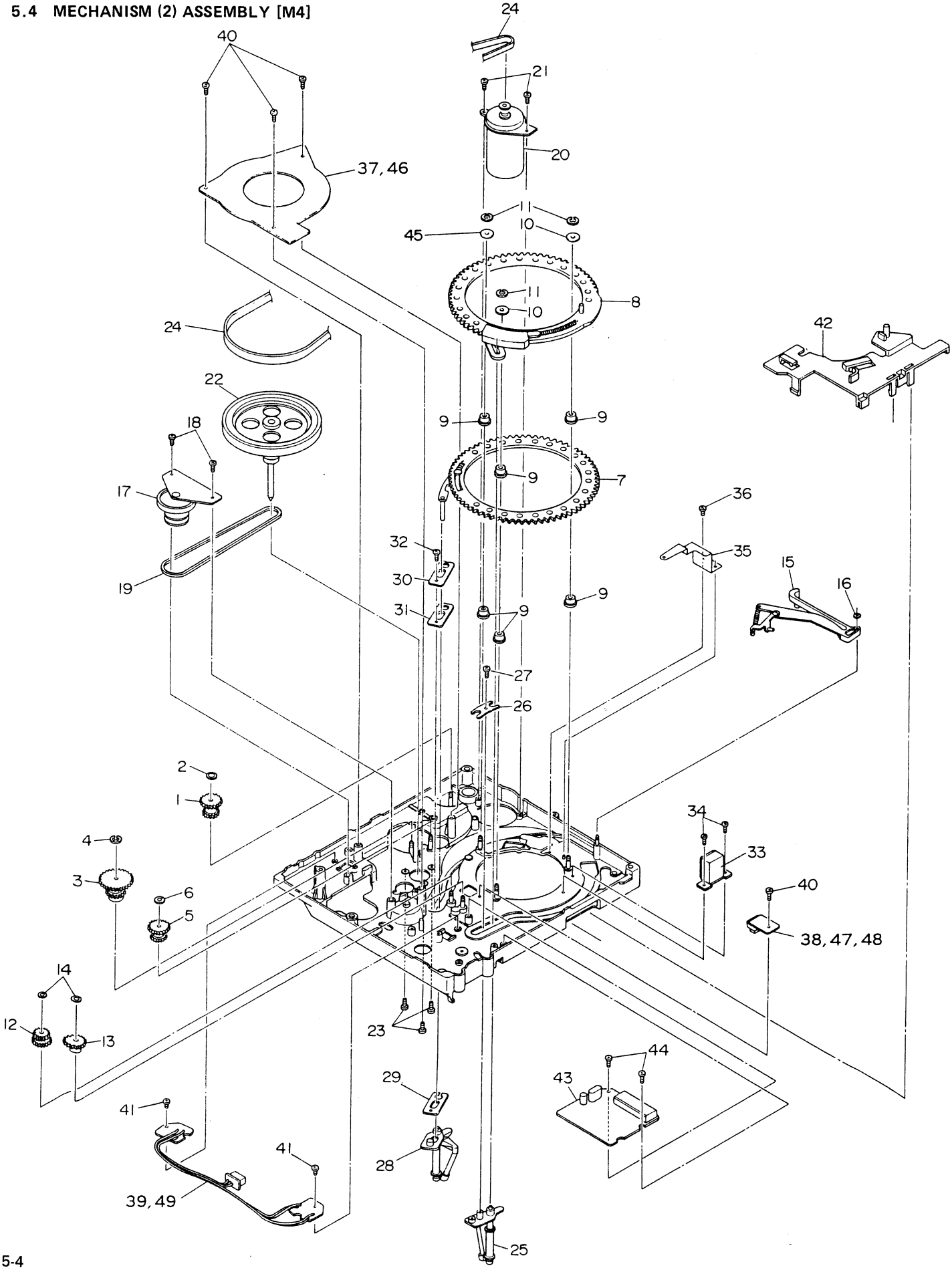
5.2 FINAL ASSEMBLY [M2]



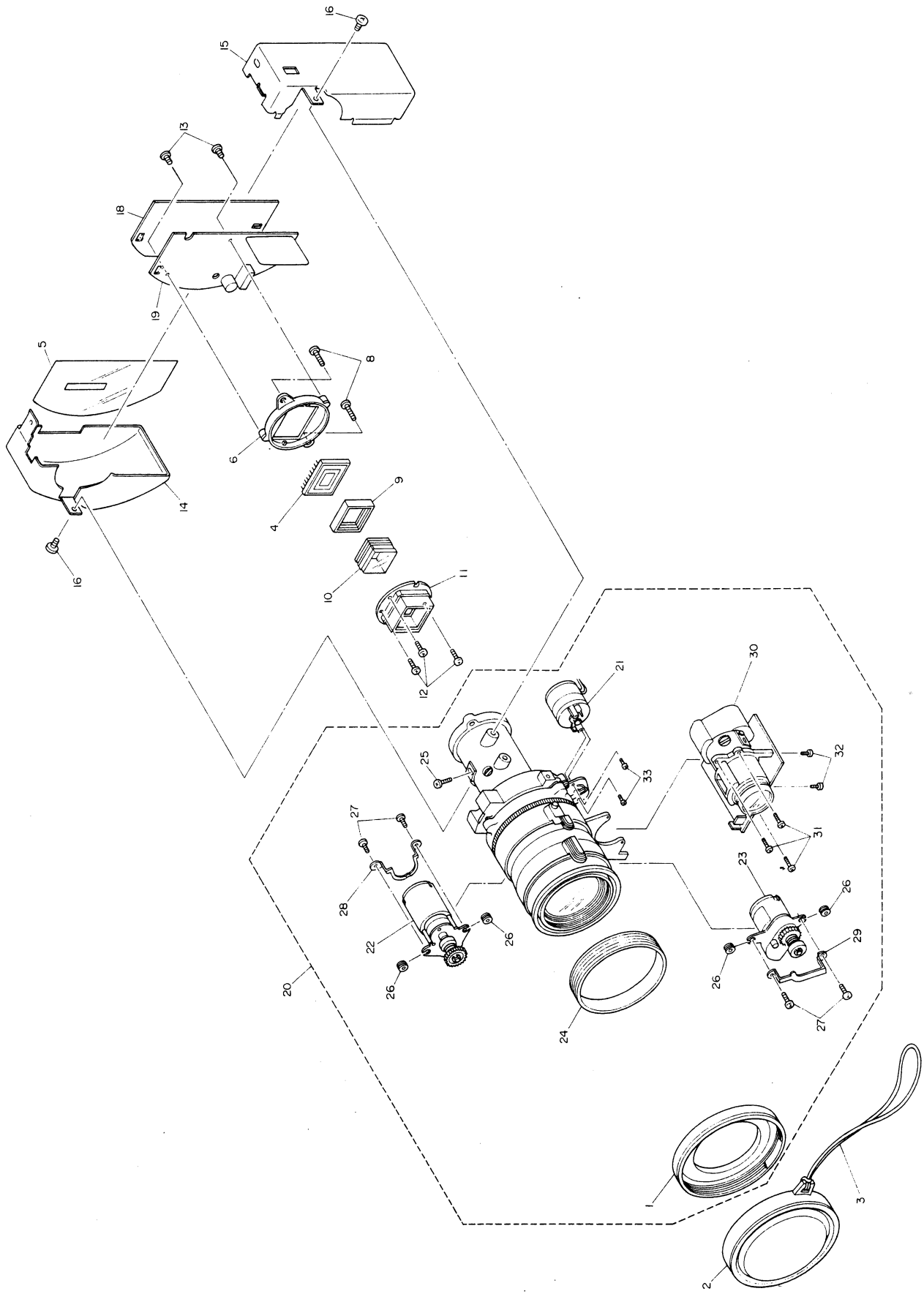
5.3 MECHANISM (1) ASSEMBLY [M3]



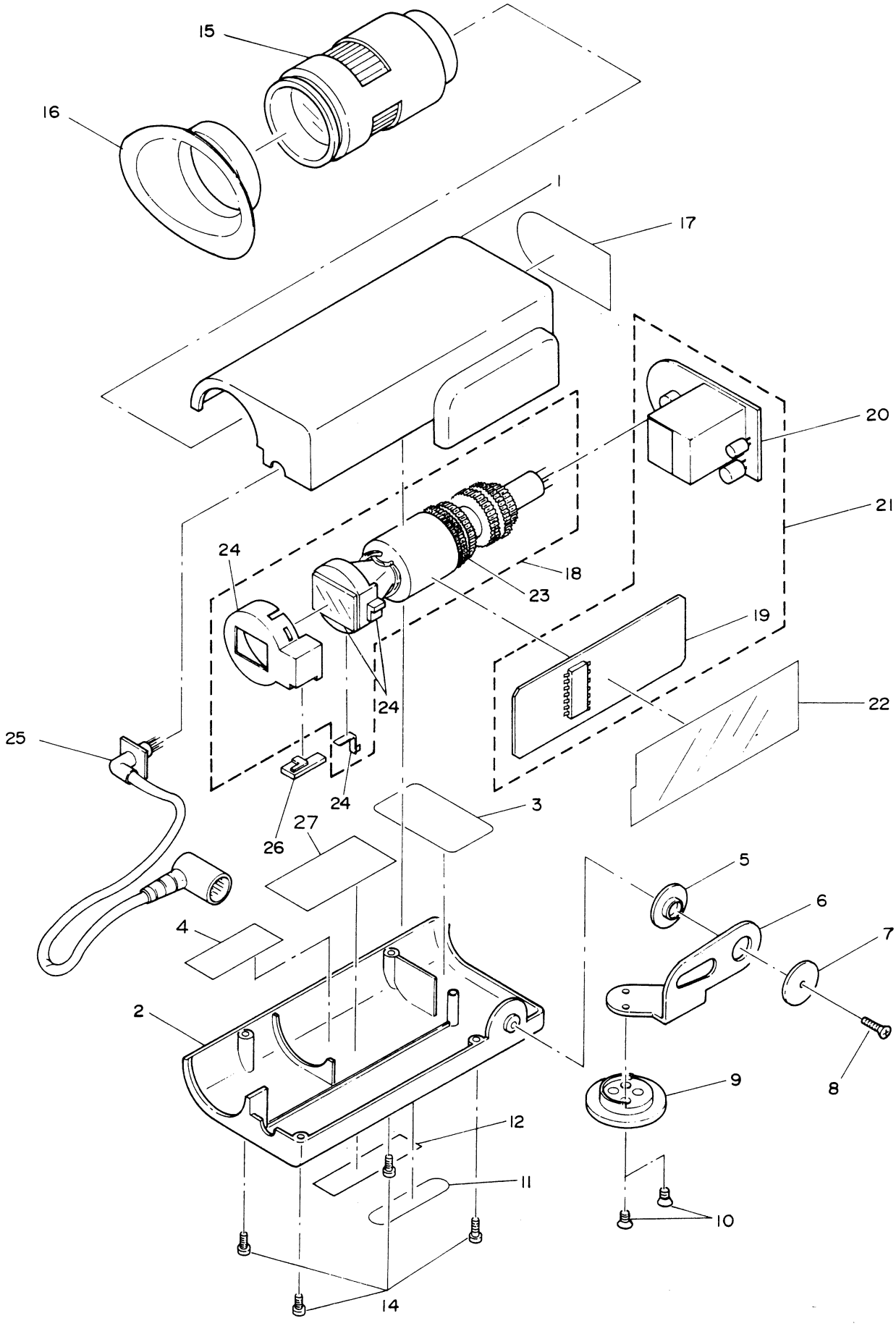
5.4 MECHANISM (2) ASSEMBLY [M4]



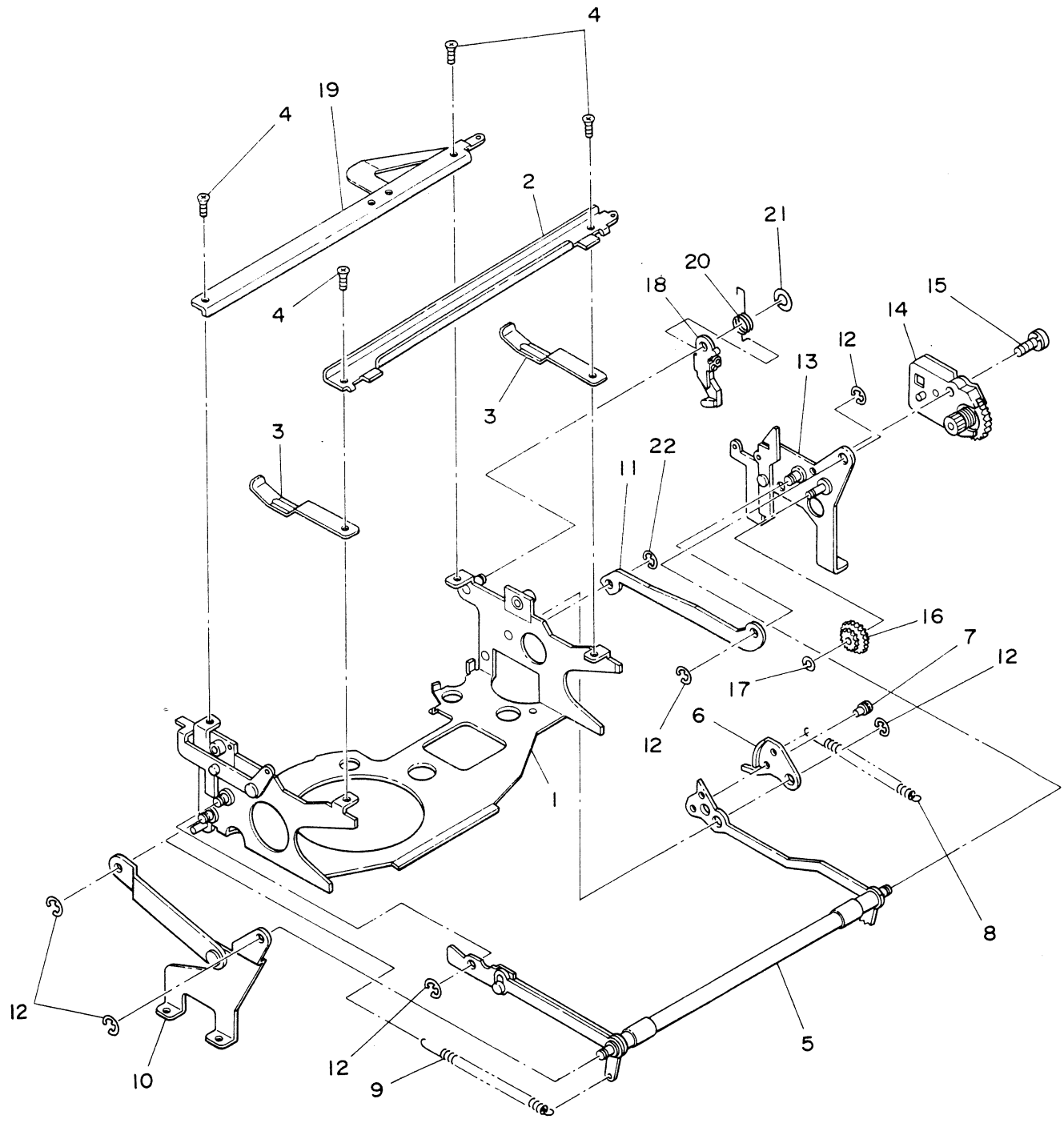
5.5 OPTICAL ASSEMBLY [M5]



5.6 ELECTRONIC VIEWFINDER ASSEMBLY [M6]



5.7 CASSETTE HOUSING ASSEMBLY [M7]



SECTION 6
PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

RESISTORS– All resistance values are in ohms (Ω), unless otherwise indicated.

k	: 1,000 (Kilo)
M	: 1,000,000 (Mega)
Chip R	: Chip Resistor
Chip VR	: Chip Variable Resistor
Comp. R	: Composition Resistor
CR	: Carbon Film Resistor
FR	: Fusible Resistor
MFR	: Metal Film Resistor
MPR	: Metal Plate Resistor
OMR	: Oxide Metal Film Resistor
PMR	: Precistion Metal Film Resistor
UFR	: Unflammable Resistor
VR	: Variable Resistor (Potentiometer)
WR	: Wire Wound Resistor

CAPACITORS–All capacitance values are in μF, unless otherwise indicated.

pF	: μμF (Pico farad)
C Cap	: Caramic Capacitor
Chip Cap	: Chip Capacitor
Chip T Cap	: Chip Tantalum Capacitor
E Cap	: Electrolytic Capacitor
FM Cap	: Film Mica Capacitor
LL Cap	: Low Leak Current Electrolytic Capacitor
MM Cap	: Metalized Mylar Capacitor
MP Cap	: Metalized Paper Capacitor
MY Cap	: Mylar Capacitor
NP Cap	: Non-polar Capacitor
PC Cap	: Polycarbonate Capacitor
PP Cap	: Polypropylene Capacitor
PS Cap	: Polystyrol Capacitor
T Cap	: Tantalum Capacitor
TF Cap	: Thin Film Capacitor
TR Cap	: Trimmer Capacitor

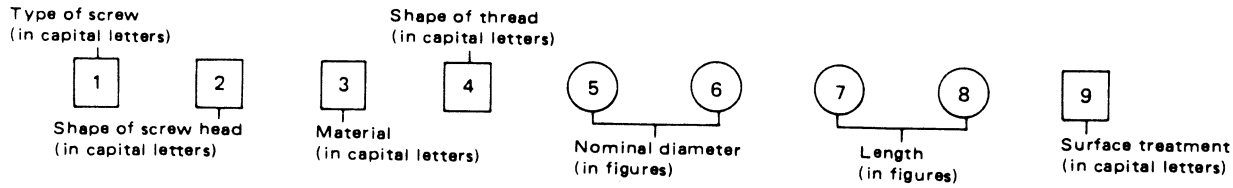
NOTES:

- [M] indicates mechanical symbol number.
- [2 digits] indicates circuit board symbol number.
- "X " indicates quantities for use.

6.1 STANDARD PART NUMBER CODING

6.1.1 Screw coding

Standard screw part numbers are as follows.

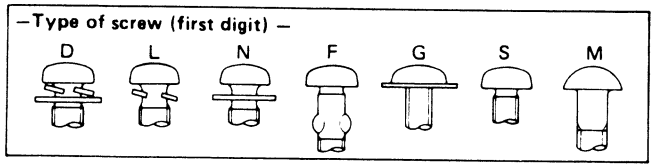


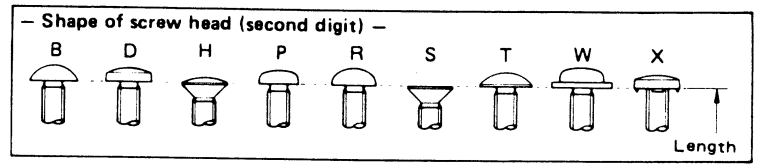
Type of screw (first digit)

- S Normal screws
- D Assembled machine screws (with plain and spring washers)
- L " (with spring washer)
- N " (with plain washer)
- F Feather screws
- G Washer head tapping screws
- M Wood screws

Shape of screw head (second digit)

- B Brazier head
- D Binding head
- H Oval countersunk head
- P Pan head
- R Round head
- S Flat head
- T Truss head
- W Washer head (machine screws)
- X Toothed head



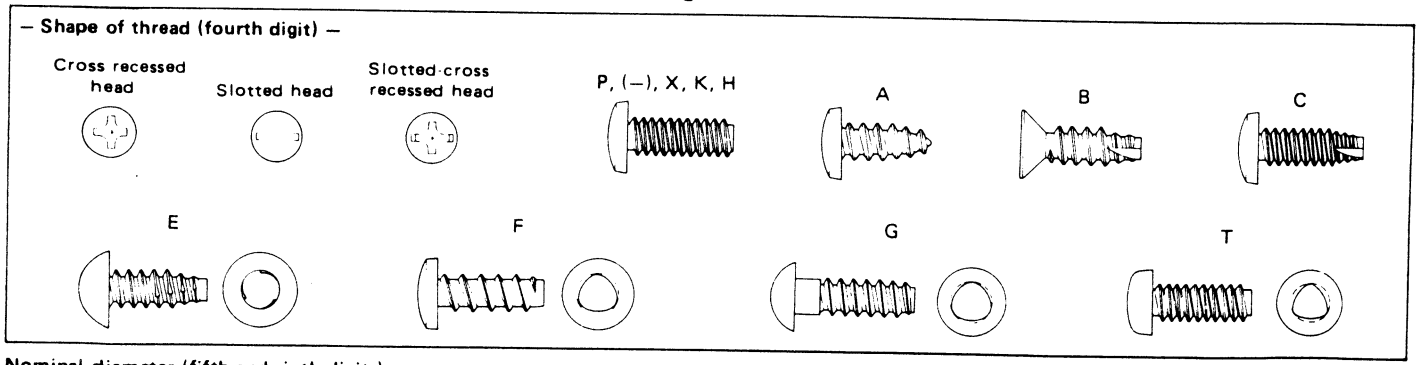


Material (third digit)

- S Steel
- E Stainless steel
- C Cast iron
- U Copper
- B Brass
- P Phosphor bronze
- N Nickel silver
- Y Cast brass
- A Aluminum
- Z Zinc alloy
- K Polycarbonate

Shape of thread (fourth digit)

- P Cross recessed head screws
- (–) Slotted head machine screws
- X Slotted-cross recessed head machine screws
- K Cross recessed head machine screws for precision equipment (type 1)
- H " (type 3)
- A Cross recessed head tapping screws (type 1)
- B " (type 2)
- C " (type 3)
- E Cross recessed head special tapping screws (brand : evertight)
- F " (brand : P-tight)
- T " (brand : taptight)
- G "



Nominal diameter (fifth and sixth digits)

The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

Length (seventh and eighth digits)

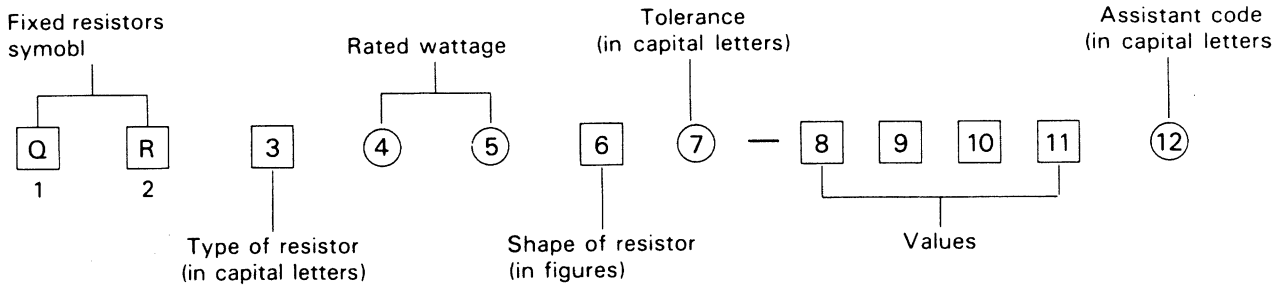
The seventh and eighth digits are numbers indicating length in milimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

Surface treatment (ninth digit)

- Z Dichromate treatment after galvanizing (MFZn II-C)
- N Nickel plating (MFNi II, MFNi I)
- R Chromium plating (MBCr II, MBCr I)
- G Silver plating (SP4)
- B Black coating after plating
- F Blackening of iron (FB)
- M Blackening after galvanizing
- K Pickling of brass (PF2)
- P Phosphate treatment
- W Uni-chrome plating
- L Coating with transparent paint
- A Coloring red after galvanizing (MFZn II-C)
- C Coloring blue after galvanizing (MFZn II-C)
- T Coloring green after galvanizing (MFZn II-C)
- V Coloring purple after galvanizing (MFZn II-C)

6.1.2 Fixed resistor coding

Fixed resistor part numbers are as follows.



Type of resistor (third digit)

C	Composition resistors
D	Carbon film resistors
F	Unflammable resistors
G	Oxide metal film resistors
H	Fusible resistors
M	Metal plate resistors
S	Metal glazed resistors
V	Precision metal film resistors
W	Wire wound resistors
X	Metal film resistors
Z	Special resistors

Rated wattage (fourth and fifth digits)

A0	1/10 W
18	1/8 W
16	1/6 W
14	1/4 W
12	1/2 W
01	1 W
02	2 W
03	3 W
04	4 W
05	5 W
06	6 W
07	7 W
75	7.5 W
08	8 W
10	10 W
15	15 W
A6	16 W
20	20 W
30	30 W

Tolerance (seventh digit)

F	± 1 %
G	± 2 %
J	± 5 %
K	± 10 %
M	± 20 %

Assistant code (twelfth digit)

A	Small type
B	Small type
S	Small type
Y	Lead taping
Z	Lead taping

Values (eighth – tenth or eleventh digits)

examples:

R47		0.47 Ω
4R7		4.7 Ω
470	47×10^0	47 Ω
471	47×10^1	470 Ω
472	47×10^2	4.7 kΩ
473	47×10^3	47 kΩ
474	47×10^4	470 kΩ
475	47×10^5	4.7 MΩ

QRV resistance shown by four digits:

4640	464×10^0	464 Ω
4641	464×10^1	4.64 kΩ
4642	464×10^2	46.4 kΩ

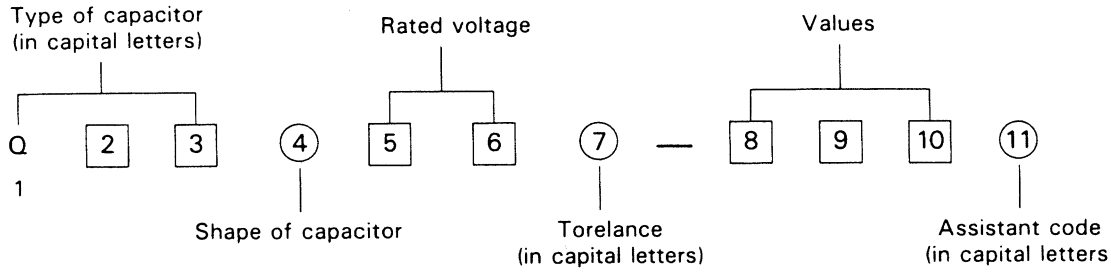
Shape of resistor (sixth digit)

Note: ■ marks are flame retardant resistor.

Shape of resistor \ Type of resistor	C	D	F	G	H	M	S	V	W	X
1										
2										
3										
4										
5									(L) type	
6										
7			Lug (B) type							
8			Lug (A) type				Chip			
9			Lug (C) type							

6.1.3 Fixed capacitor coding

Fixed capacitor part numbers are as follows.



Ceramic capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Mono-direction	Kink lead	Axial lead	Axial forming lead	Chip
QCC	Ceramic	1		4	5	
QCD	High capacitance					A
QCF	High capacitance	1,4	3			8,A
QCS	Temperature compensation	1	3	4	5	8,A
QCT	Temperature compensation	Special coding				8,A
QCV	Ceramic			1	3	
QCX	Ceramic			1	3	
QCY	High capacitance	1,4	3	6	7	8,A
QCZ	Special type	Special coding				

Electrolytic capacitors

Type of capacitor (first-third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEB	Low leakage		4	5	6	
QEC	Low leakage		4,8,A	9,B	6,C	
QEE	Tantalum (normal)		4	5	6	
	Tantalum (small)		8			
QEF	Chip tantalum	8 (chip type)				
QEG	Low impedance		4			
QEK	Miniature type		4	5	6	
QEL	Small type		4	5	6	7
QEM	Small type		4	5	6	
QEN	Non-polar	2	4	5	6	
QEP	Non-polar (small)		4,A	5,B	6,C	
QER	Miniature type		4	5	6	
QET	Small type	2	4	5,B	6,C	7
QEU	Small type		4	5	6	
QEV	Small type		4		6	7
QEW	Normal	2	4	5	6	7

Paper film capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
		Tubular	Normal		Flame retardant	
Symbol	Characteristics		Mono-direction	Kink lead	Mono-direction	Kink lead
QFA	Metalized polypropylene				7	
QFE	Metalized mylar				5	
QFF	Film mica		4			
QFG	Polypropylene film		4	8		
QFH	Metalized mylar	2	4	3	5,7	6
QFJ	Mylar (special)		4			
QFK	Metalized mylar (small)				5	
QFM	Mylar	2	4	3,7	5	6
QFN	Mylar (small)		4	3		
QFP	Polypropylene		4	3,8		
QFS	Polystyrole	2	4	3		
QFV	Thin film		4	8		
QFZ	Special type	Special coding				

Rated voltage (fifth and sixth digits)

Fifth digit \ Sixth digit	A	B	C	D	E	F	G	H	J	K	V	W	X
0						3.15	4.0		6.3				
1	10		16	20	25		40	50	63	80	35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

Tolerance (seventh digit)

A	$^{+100}_{-10}$ %	M	±20 %
F	±1 %	N	±30 %
G	±2 %	P	$^{+100}_{-0}$ %
H	$^{+50}_{-10}$ %	R	$^{+30}_{-10}$ %
J	±5 %	X	$^{+40}_{-20}$ %
K	±10 %	Z	$^{+80}_{-20}$ %

Values (eighth – tenth digits)

Example : Values are in picofarads

101	10×10^{1} pF	100 pF
102	10×10^{2} pF	1,000 pF (0.001 μF)
103	10×10^{3} pF	10,000 pF (0.01 μF)
104	10×10^{4} pF	100,000 pF (0.1 μF)
105	10×10^{5} pF	1 μF
5R0		5.0 pF

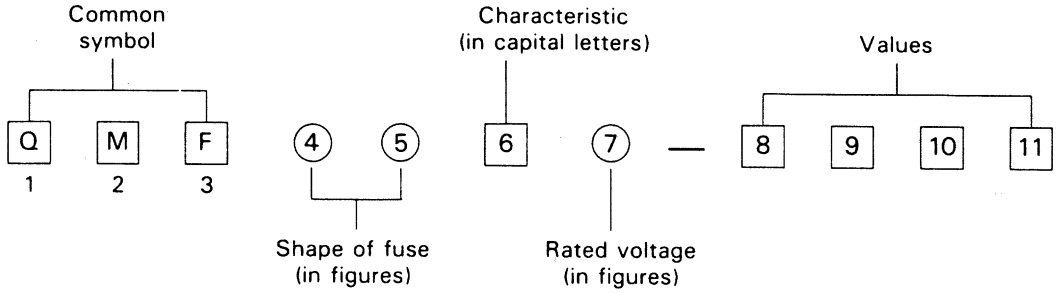
Assistant code (eleventh digit)

G Small size

Z Lead taping

6.1.4 Fuse coding

Standard fuse part numbers are as follows.



Shape of fuse
(fourth and fifth digits)

51	ϕ5.2 × 20 mm
60	ϕ6.4 × 30 mm
61	ϕ6.35 × 31.8 mm
63	ϕ6.4 × 30 mm with lead wires
66	ϕ6.35 × 31.8 mm with lead wires
00	Special type

Rated voltage
(seventh digit)

1	AC125 V
2	AC250 V
3	0.1 – 1 A : AC250 V 1.25 – 6.3 A : AC125 V

Values
(eighth-tenth or eleventh digits)
example:

R63	..... 0.63 A
1R0	..... 1.0 A
2R5	..... 2.5 A
100	..... 10 A
R315	..... 0.315 A
1R25	..... 1.25 A

Characteristics (sixth digit)

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO, Europe)
	275 %	0.05 – 2 sec.	
	400 %	0.01 – 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type
	200 %	Within 2 min.	
S	160 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
	700 % – 2000 %	Within 0.01 sec.	
U	135 %	Within 1 hr.	Anti-rush type (for UL)
	200 %	Within 2 min.	
	800 % – 2000 %	Within 0.01 sec.	

#	⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
				PACKING AND ACCESSORIES [M1]
		1	PQ31365-3	PACKING CASE, EG
			PQ31365-4	PACKING CASE, EK
		2	PQ20335	CUSHION(L), X2
		3	–	FINAL ASS'Y, REFER TO [M2]
		4	PQM30021-64	POLY BAG, EG
			PUP30320-27	POLY BAG, EK
		5	PUP40329	SERIAL NO. STICKER, X2
		6	–	E. VIEWFINDER ASS'Y, REFER TO [M6]
		7	–	RF UNIT, RF-P1E, INCL. 27
				REFER TO SERVICE MANUAL NO. 8361
	⚠	8	PU59526	CABLE ASS'Y, EG
	⚠		PU57546	CABLE ASS'Y (B), EK
		9	QPGA015-02505	POLY BAG
	⚠	10	PU30425-854	INSTRUCTION BOOK, EG
	⚠		PU30425-860	INSTRUCTION BOOK, EK
		11	BT-20060	GUARANTY CARD, EK ONLY
	⚠	12	PU30425-655-1	INSTRUCTION BOOK, FOR C-P3U
		13	BT-20066	GUARANTY CARD, EK ONLY
		14	QPGA025-03505	POLY BAG, EG
			PQM30023-5	POLY BAG, EK
		15	–	CASSETTE TAPE, EC-30
		16	–	BATTERY PACK, NB-P7U
		17	–	AC POWER ADAPTER, AA-V2EG/EK,
				REFER TO SERVICE MANUAL NO. 8424
		18	PQ31233A-9	SHOE ADAPTER ASS'Y
		19	–	SHOULDER STRAP, VU-V17U, REFER TO
				SERVICE MANUAL NO. 8458 (4/5)
		20	–	CARRYING CASE, CB-V50U, REFER TO
				SERVICE MANUAL NO. 8458 (3/5)
	⚠	21	PU36158-1-1	DBP INF SHEET, EG ONLY
		22	PQ42620-1-1	MIC PROTECTOR
		23	UM-3DJ	BATTERY, R6 TYPE
		24	PQM30021-48	POLY BAG
		25	–	CASSETTE ADAPTER, C-P3U
		26	–	–
	⚠	27	PU55906	AERIAL CABLE ASS'Y
		28	PQ42594B	PAD ASS'Y
	⚠	29	PU57548	CABLE ASS'Y (P), EG ONLY
		30	QPGA015-02505	POLY BAG, EG ONLY

#	⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
				FINAL ASSEMBLY [M2]
		1	–	MECHANISM ASS'Y, REFER TO [M3],
				[M4]
		2	–	CASSETTE HOUSING ASS'Y, REFER
				TO [M7]
		3	–	Y/C BOARD ASS'Y, REFER TO [02]
		4	–	MAIN BOARD ASS'Y, REFER TO [01]
		5	–	OPERATION BOARD ASS'Y, REFER
				TO [03]
		6	–	IMAGER BOARD ASS'Y, REFER TO
				[21], [22]
		7	–	EE & IND BOARD ASS'Y, REFER TO
				[24]
		8	–	VIDEO BOARD ASS'Y, REFER TO [23]
		9	–	–
		10	–	REGULATOR BOARD ASS'Y, REFER
				TO [28]
		11	–	CONTROL BOARD ASS'Y, REFER TO [26]
		12	–	OPTICAL ASS'Y, REFER TO [M5]
		13	–	DRUM ASS'Y, REFER TO [M3]
		14	–	TRIGGER BOARD ASS'Y, REFER TO [27]
		15	–	SKEW JUMP BOARD ASS'Y, REFER
				TO [12]
		16	–	END ALARM BOARD ASS'Y, REFER TO [13]
		17	–	PAL SUB BOARD ASS'Y, REFER TO [29]
		18	–	–
		19	–	–
		20	–	–
	⚠	21	PQ10304E-13	LOWER CASE ASS'Y, INCL. 91–105
		22	PQ42559-1-2	SHOE SPRING
		23	PQ31190-1-5	SHOE
		24	SSSP2010M	SCREW, X2, SHOE
		25	PU59004-1-1	ZOOM SWITCH
	⚠	26	PQ20269B	SIDE PANEL ASS'Y
		27	PQ42246	BUTTON (2), FULL AUTO
		28	PQ42247	BUTTON (3), X2, FILTER, FOCUS
	⚠	29	PQ10305D	FRONT PANEL ASS'Y
		30	PQ42057-1-4	PLAY BUTTON
		31	PQ42058-1-6	STOP BUTTON
		32	PQ42059-1-2	FF BUTTON
		33	PQ42060-1-2	REW BUTTON
		34	PQ42061-1-2	VF MODE BUTTON
		35	PQ42062-1-2	PAUSE BUTTON
		36	PQ42066	REC BUTTON
		37	PQ42251-1-3	POWER BUTTON
		38	PQ42252	SLIDE KNOB, SP/LP
		39	PQ31313A	MIC JACK COVER ASS'Y
		40	PU56808-2	JACK ASS'Y
		41	–	–
		42	SSSP2004M	SCREW, X 2
		43	PQ31095A-3	BASE ASS'Y
		44	SSSP2604M	SCREW, X4, BASE ASS'Y
	⚠	45	PQ10306B-2	UPPER CASE ASS'Y, INCL. 46–48
		46	PQ42253-2	REC REV BUTTON
		47	PQ42239	HOOK (1)
		48	SSSP2004M	SCREW, X2, UPPER CASE
		49	PU59006-2	TAPE COUNTER
	⚠	50	PQ31332E-9	CASSETTE COVER ASS'Y, INCL. 51
		51	PQ31428-2	LABEL
		52	SDSP2004M	SCREW, X2, CASSETTE COVER
		53	SSSP2004M	SCREW, PLATE HOOK, X 3
		54	SSSP2010M	SCREW, PLATE
		55	SSSG2608M	TAPPING SCREW, X 3
		56	SDSG2606Z	TAPPING SCREW, SIDE PANEL
		57	PQ31198	TRIGGER BUTTON
		58	–	RATING LABEL

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
⚠	59	PQ31340-4	BATTERY CAUTION LABEL
	60	PU58213	VMP CAP
	61	SPSG2620Z	TAPPING SCREW, X3, MAIN DECK
	62	PQ31195	BOARD HOLDER
	63	SDSF2608Z	TAPPING SCREW, BOARD HOLDER
	64	PQ31196-1-4	BOARD HOLDER
	65	SDSF2608Z	TAPPING SCREW, SHIELD PLATE
	66	PQ42288	PLATE NUT (3)
	67	SDSF2005Z	TAPPING SCREW, PLATE NUT (3)
	68	SDSF2005Z	TAPPING SCREW, CONTROL BOARD, X 3
	69	SDSF2005Z	TAPPING SCREW, X5, OPERATION BOARD
	70	–	–
	71	SPSH1740M	SCREW
	72	–	–
	73	–	–
	74	–	FUSE, REFER TO [01], F1
	75	SPSH1740M	SCREW, X4, CASSETTE HOUSING
	76	SPSN1740M	SCREW, MAIN BOARD
	77	SDSF2608Z	TAPPING SCREW, DC-DC CONVERTER
	78	PU36078-1-3	SHIELD PLATE, CAMERA ASS'Y
	79	PU59008	8PIN CONNECTOR, E. VF ASS'Y
	80	PU59005C	MICROPHONE
	OR	PU59451	MICROPHONE
⚠	81	PU59143-3	DC-DC CONVERTER
	82	–	–
⚠	83	PU54705-2	CAUTION LABEL
	84	PU59232-2	FEATURE LABEL
	85	–	–
	86	PQ42686	SHIELD PLATE
	87	PQ31470	SHIELD PLATE
	88	PQ42837	SPACER
	89	PU58339	SHOE EARTH
	90	PQ42548-4	PLATE
	91	PQ31199	TRIGGER BUTTON COVER
	92	PQ42232	SHOE BASE
	93	SSSP2004M	SCREW, X 2
	94	PQ42516	SHEET, X 2
	95	PQ42233-1-1	TERMINAL PLATE, X 2
	96	PQ42240	HOOK (2)
	97	SSSP2004M	SCREW
	98	PQ42243	PLATE NUT (2)
	99	SSSP2004M	SCREW
	100	PQ42554	GRIP RUBBER
	101	PQ31231B-3	GRIP BELT ASS'Y
	102	SDSG2008Z	TAPPING SCREW, X4, GRIP BELT ASS'Y
	103	–	–
	104	PQ42496	CCD MARK
	105	PQ42420	W. FILTER
	106	PQM30029-86	SPACER, X2
	107	PQ41450	SCREW, SHIELD PLATE
	108	SDSF2604Z	TAPPING SCREW, PAL SUB BOARD
	109	–	NEMKO LABEL
⚠	110	PQM30044-15	DBP LABEL
	111	SPSH1740M	SCREW, X2, E. ALARM BOARD

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			MECHANISM (1) ASSEMBLY [M3]
	1	–	MAIN DECK ASS'Y
⚠	2	PU58720G-1	MODE CONTROL MOTOR ASS'Y
	3	SPSH1740M	SCREW, X 2
	4	PQ41059B-5	PINCH ROLLER BAR ASS'Y
	5	REE2500	E RING
	6	PQ41063A-3	PINCH ROLLER ARM SUB ASS'Y
	7	PQ42302A	PINCH ROLLER ASS'Y
	8	SPSH1720M	SCREW
	9	REE2500	E RING
	10	PQ42095A	BRAKE CONTROL ARM ASS'Y
	11	PQM30018-21	SPACER
	12	PQ42097A-5	HEAD ARM ASS'Y
	13	PQ42107	A/C HEAD BASE
	14	PQ42682	HEAD SPRING
	15	PU58722-1-1	A/C HEAD
	16	SPSK1740M	SCREW, X 3
	17	PQ40620-1-4	SPECIAL SCREW, X 2
	18	PQ42112	TORSION SPRING
	19	Q03093-825	WASHER
	20	PQM30002-111	SPRING
	21	PQM30018-21	SPACER
	22	PQ42457A-3	CONTROL CAM ASS'Y
	23	Q03093-825	WASHER
	24	PU58749-2-6	MODE CONTROL SWITCH ASS'Y
	25	PQ42856	MIDDLE POLE STOPPER
	26	PQ42527	COVER (A/C HEAD)
	27	SPSH1740M	SCREW, X2
	28	PQ42120A	EJECT LEVER ASS'Y
	29	PQM30017-25	SLIT WASHER
	30	PQ42134A-2	MIDDLE POLE ASS'Y
	31	SPSH1740M	SCREW
	32	PU58724	CLUTCH GEAR (S)
	33	PQM30017-15	SLIT WASHER
	34	PU58725-1-1	CLUTCH GEAR (T)
	35	PQM30017-15	SLIT WASHER
	36	PQ42153-1-3	SUPPLY IDLER GEAR
	37	PQM30017-15	SLIT WASHER
	38	PU58726	SUPPLY REEL DISK
	39	PQM30018-40	SPACER
	40	PQM30017-34	SLIT WASHER
	41	PQM30002-177	SPRING
	42	SPSH1780N	SCREW
	43	PQ42155A-2	TENSION ARM SUB ASS'Y
	44	PQ42158A	TENSION BAND ASS'Y
	45	PQM30001-215	SPRING
	46	PQ42163	TENSION BAND PLATE
	47	PQM30001-202	TENSION SPRING
	48	PQM30013-7-2	FLANGE COLLAR
	49	PQM30017-15	SLIT WASHER
	50	SPSH1740M	SCREW
	51	PQ42164	TAKE-UP REEL GEAR
	52	Q03093-829	WASHER
	53	PQM30017-25	SLIT WASHER
	54	PU58729-1-1	IDLER ARM
	55	PQ42165-1-2	TORSION SPRING
	56	PQM30017-16	SLIT WASHER

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	57	PQ42167	MAIN BRAKE (S)
	58	PQ42168	ROD
	59	PQM30001-203	TENSION SPRING, MAIN BRAKE (T)
	60	PQ42174-1-3	MAIN BRAKE (T)
	61	PQ42175-1-1	ROD, TENSION BAND PLATE
	62	PQ42170	OFF LEVER
	63	PQ42171-1-1	ROD
	64	PQ42172	ROD
	65	PQM30017-25	SLIT WASHER
	66	REE1500	E RING, X 2
	67	PQ42176A	SEARCH BRAKE ASS'Y
	68	–	–
	69	PQ41450-1	SCREW
	70	PQ42178A	TENSION LEVER ASS'Y
	71	PQM30013-7-2	FLANGE COLLAR
	72	SPSH1740M	SCREW
	73	PQ42180	TENSION BAR
	74	PQM30013-7-2	FLANGE COLLAR
	75	SPSH1740M	SCREW
	76	PQM30017-25	SLIT WASHER
	77	PQ42667A	ERASE HEAD ARM ASS'Y
	78	PU56330	FULL ERASE HEAD
	79	SPSP2003Z	SCREW
	80	PQ41134-3	TAPE GUIDE (S)
	81	PQM30002-152	SPRING
	82	PQ41135-3	GUIDE FLANGE, X 2
	83	SSSH1450M	SCREW
	84	PQ42548	PLATE
	85	PQ42305B-3	IMPEDANCE ROLLER ARM ASS'Y
	86	PQ42653	TORSION SPRING
	87	PQM30017-26	SLIT WASHER, X 2
	88	PU2226683	END SENSOR TR ASS'Y, INCL. 89, 90, 115–117, [09]
	89	PU57130	CASSETTE SWITCH
	90	SPST2606Z	TAPPING SCREW
	91	SPSH1740M	SCREW
	92	–	–
	93	PU58737	REC SAFETY SWITCH
	94	SPSH1780M	SCREW
	95	–	–
	96	PDM2015B	UPPER DRUM ASS'Y
	97	PDM2017C	LOWER DRUM ASS'Y
	98	PQ30235A-3	DRUM BASE ASS'Y
	99	–	PRE AMP IC, REFER TO [04]
	100	PU56420-3	DEW SENSOR
	101	PQ41535-2	SCREW, X 2
	102	SPSK1760M	SCREW, X 4
	103	DPSP2005Z	ASS'Y SCREW
	104	SPSK1720M	MINI SCREW, X 2
	105	–	–
	106	PDV2050A	DRUM ASS'Y, INCL. 96–104
	107	Q03093-838	WASHER
	108	SPSH1760M	SCREW, DRUM ASS'Y, X 3
	109	PQ41450	SCREW
	110	PQ42860	COVER
	111	PQ42689	BOARD BRACKET, END ALARM BOARD
	112	SPSH1730	SCREW, X2
	113	–	–
	114	PQ42857	BRACKET
	115	TPS605	PHOTO TRANSISTOR
	116	PQ40735-2-5	END SENSOR BRACKET
	117	PU48793	CAP

MECHANISM (2) ASSEMBLY [M4]

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	1	PQ42502	LOADING GEAR (1)
	2	PQM30017-25	SLIT WASHER
	3	PQ42122A	LOADING GEAR (3) ASS'Y
	4	REE2000	E RING
	5	PQ42123	LOADING GEAR (4)
	6	PQM30017-25	SLIT WASHER
	7	PQ42124A-1	LOADING RING (T) ASS'Y
	8	PQ42127A	LOADING RING (S) ASS'Y
	9	PQ42131	COLLAR, X 6
	10	PQM30018-10	SPACER, X 2
	11	REE1500	E RING, X 3
	12	PQ42132-1-1	RING IDLER GEAR (1)
	13	PQ42133	RING IDLER GEAR (2)
	14	PQM30017-25	SLIT WASHER, RING IDLER GEARS, X 2
	15	PQ42141A-2	MIDDLE POLE LEVER ASS'Y
	16	PQM30017-15	SLIT WASHER
	17	PQ42145A	CENTER PULLEY ASS'Y
	18	SPSK1740M	SCREW, CENTER PULLEY ASS'Y, X 2
	19	PQM30003-13	BELT, CENTER PULLEY ASS'Y
⚠	20	PU58727W	CAPSTAN MOTOR ASS'Y
	21	SPSH1740M	SCREW, X 2
	22	PQ42537B	CAPSTAN FLYWHEEL ASS'Y
	23	SPSH1740M	SCREW, CAPSTAN MOTOR ASS'Y, X 3
	24	PQM30004-3	BELT, CAPSTAN MOTOR
	25	PQ41484C-3	SUPPLY POLE BASE ASS'Y
	26	PQ40599-2	SLIDE PLATE (S)
	27	SPSK1740M	SCREW
	28	PQ41485D-6	TAKE-UP POLE BASE ASS'Y
	29	PQ40730	SLIDER SPRING
	30	PQ40731	SLIDE WASHER
	31	PQ42593	SLIDE PLATE (T)
	32	SPSH1740M	SCREW
	33	PU56421-2	PICK UP HEAD
	34	SPSK1740M	SCREW, X 2
	35	PU58734-1-4	BRUSH
	36	SPSH1720M	SCREW
	37	PU22266B1	FG PLATE ASS'Y, [11], INCL. 46
	38	PU22266B2	END SENSOR LED ASS'Y, [10], INCL. 47, 48
	39	PU22266B4	REEL SENSOR ASS'Y, X2, [07], [08], INCL. 49
	40	SPSH1740M	SCREW, X 4
	41	SPSH1720M	SCREW, X 2
	42	PQ31339	COVER (BOTTOM)
	43	–	MDA BOARD ASS'Y, REFER TO [05]
	44	SPSH1740M	SCREW, MDA BOARD, X 2
	45	PQM30018-46	SPACER
	46	PU58655-2	CAP. HOUSING, X2
	47	TLN107A	IR LED
	48	PQ40734	END SENSOR MOLD
	49	TLP907	PHOTO SENSOR, X2

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			OPTICAL ASSEMBLY [M5]
	1	PU58924	HOOD
	2	PQ31311	HOOD CAP
	3	PQ42477	STRING
	4	UPD3525D	IC, IMAGER (2) BOARD
	5	PQ42338	INSULATOR
	6	PQ31191	IMAGER HOLDER
	7	–	–
	8	DPSP2008Z	SCREW, X 2
	9	PQ42339	SPACER RUBBER
	10	PU58927	OPTICAL LPF
	11	PQ31192	OPTICAL LPF HOLDER
	12	SPSK2004F	MINI SCREW, X 3
	13	SPSP2004Z	SCREW, X 2
	14	PQ20297	R SHIELD CASE
	15	PQ20298	L SHIELD CASE
	16	SDSA2604Z	TAPPING SCREW, X 2
	17	–	–
	18	–	IMAGER (1) BOARD ASS'Y, REFER TO [21]
	19	–	IMAGER (2) BOARD ASS'Y, REFER TO [22]
⚠	20	PU58923	OPTICAL BLOCK ASS'Y, INCL. 1 AND 21–33
⚠	21	PU58923-001	IRIS DRIVER UNIT
⚠	22	PU58923-002	ZOOM MOTOR UNIT
⚠	23	PU58923-003	AF MOTOR UNIT
	24	PU58923-015	FOCUSING RING
	25	PU58164-031	TAPPING SCREW
	26	PU58923-022	MOTOR RUBBER, X 4
	27	PU58923-023	TAPPING SCREW, X 4
	28	PU58923-024	ZOOM MOTOR BRACKET
	29	PU58923-025	AF MOTOR BRACKET
	30	PU58923-032	AF SENSOR UNIT
	31	PU58923-033	TAPPING SCREW, X 3
	32	PU58923-017	TAPPING SCREW, X 2
	33	PU58923-026	TAPPING SCREW, X 2

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			ELECTRONIC VIEWFINDER ASSEMBLY [M6]
	1	PU59349	TOP CASE
	2	PU59366	BOTTOM CASE
	3	PU59090-4	CAUTION LABEL, HIGH VOLTAGE CAUTION
	4	PU59524-2	NAME LABEL
	5	PU59090-6	BUSHING
	6	PU59090-7	PLATE
	7	PU59090-8	SPACER
	8	PU59090-9	TAPPING SCREW
	9	PU59090-10	BRACKET
	10	PU59090-11	TAPPING SCREW, X 2
	11	PU59368	SERIAL NO. LABEL
	12	PU59522	WARNING LABEL
	13	–	–
	14	PU59090-15	TAPPING SCREW, X 4
	15	PU59090-16	LENS ASS'Y
	16	PU59090-17	LENS RUBBER
	17	PU59354-2	NAME PLATE
	18	PU59090-20	CRT ASS'Y, INCL. 23, 24
	19	–	E. VF (1) BOARD ASS'Y, REFER TO [30]
	20	–	E. VF (2) BOARD ASS'Y, REFER TO [31]
	21	PU59336B	E. VF BOARD ASS'Y, INCL. 19, 20, 25
	22	PU59090-24	INSULATOR
	23	–	DEFLECTION YOKE, REFER TO PAGE 6-35
	24	–	CRT, INCL. 26, REFER TO PAGE 6-35
	25	PU59090-29	VIEWFINDER CABLE
	26	PU59090-33	TERMINAL COVER, HIGH VOLTAGE
	27	PU59523	X-RAY LABEL
⚠	–	PU58762D	E. VF ASS'Y, INCL. 1–27

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			CASSETTE HOUSING ASSEMBLY [M7]
	1	PQ31064B	CASSETTE HOLDER ASS'Y
	2	PQ42416-1-2	HOLDER STAY (1)
	3	PQ42105	PUSH PLATE, X 2
	4	SSSK1720M	SCREW, X 4
	5	PQ42109A	HOLDER SHAFT ASS'Y
	6	PQ40565	ATTACHMENT
	7	PQ41450-2	SCREW
	8	PQ40566-5	SPRING, RIGHT
	9	PQ40566-6	SPRING, LEFT
	10	PQ42130A-1-1	LEFT BRACKET ASS'Y
	11	PQ42182	SUB ARM, RIGHT
	12	REE2000	E RING, X 6
	13	PQ42188A	RIGHT BRACKET ASS'Y
	14	PU56781	DAMPER
	15	LPSP2006Z	SCREW
	16	PQ40579	SECOND GEAR
	17	PQM30017-14	SLIT WASHER
	18	PQ42193A	OPEN DOOR ASS'Y
	19	PQ42084A	HOLDER STAY ASS'Y
	20	PQ41532	TORSION SPRING
	21	PQM30017-16	SLIT WASHER
	22	REE1500	E RING
	23	PUS28324C	CASSETTE HOUSING ASS'Y, INCL. 1–22

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
		PU11348E-2-C	MAIN BOARD ASS'Y [01]
	– REGULATOR SECTION –		
⚠	IC1	S-81250AG	INTEGRATED CIRCUIT
	Q1	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	Q2	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	Q3	2SD601	CHIP TRANSISTOR
	Q4	2SD601	CHIP TRANSISTOR
	D1	ERA81-004	DIODE
	D2	RD3.9M-T1B	CHIP ZENER DIODE
	D3	RD5.6M-T2B	CHIP ZENER DIODE
	D4	MA151WK	CHIP DIODE
	OR	DAN202K	CHIP DIODE
	D5	MA151WK	CHIP DIODE
	OR	DAN202K	CHIP DIODE
	R1	QRD167J-125	CR
	R2	QRSA08J-684YN	CHIP R
	R3	QRSA08J-100YN	CHIP R
	R4	QRSA08J-121YN	CHIP R
	R5	QRSA08J-271YN	CHIP R
	R6	QRSA08J-102YN	CHIP R
	R7	QRSA08J-102YN	CHIP R
	R8	QRSA08J-125YN	CHIP R
	C1	–	–
	C2	QEK41CM-476	E CAP
	C3	QEK41CM-476	E CAP
	C4	QED41CM-476	E CAP
	C5	QED41CM-476	E CAP
	C6	QED41AM-826	E CAP
	C7	QED41AM-826	E CAP
	C8	QEMA1AM-107	E CAP
⚠	RY1	PU56400-2	RELAY
	JACK1	PU57179	DC JACK
⚠	F1	QMF51E2-3R15	FUSE (NOT INCL. IN MAIN BOARD ASS'Y)
⚠	FC1	PU57505	FUSE CLIP, FOR F1, X2

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
⚠	CP1	ICP-F15	CIRCUIT PROTECTOR
⚠	CP2	ICP-F20	CIRCUIT PROTECTOR
⚠	CP3	ICP-F20	CIRCUIT PROTECTOR
⚠	CP4	ICP-F15	CIRCUIT PROTECTOR
⚠	CP5	ICP-F20	CIRCUIT PROTECTOR
	TP	PU56278	TEST PIN, TP1, 2
⚠	DC CONV	PU58603-2-1	DC-DC CONVERTER
	– SERVO SECTION –		
	IC101	BA8526K	FLAT IC
	OR	BA8527K	FLAT IC
	IC102	BAF6305	FLAT IC
	IC103	PU22441A-2-C	F/V MOD. (JC001)
	IC104	M51797FP	FLAT IC
	IC105	M50252FP	FLAT IC
	IC106	M51722FP	FLAT IC
	IC107	M54643L	INTEGRATED CIRCUIT
	IC108	AFC74A001X1	INTEGRATED CIRCUIT
	Q101	2SK621	CHIP DIGITAL FET
	Q102	–	–
	Q103	–	–
	Q104	2SD601	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	Q105	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q106	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q107	2SD601	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	Q108	–	–
	Q109	–	–
	Q110	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q111	2SK621	CHIP DIGITAL FET
	Q112	2SK621	CHIP DIGITAL FET
	Q113	2SK621	CHIP DIGITAL FET
	Q114	–	–
	Q115	2SA1365-T1G	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	OR	2SA1036KT-96R	CHIP TRANSISTOR
	OR	2SB624-T1BBV5	CHIP TRANSISTOR
	Q116	2SA1365-T1G	CHIP TRANSISTOR
	OR	2SA1036KT-96R	CHIP TRANSISTOR
	OR	2SB624-T1BBV5	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	Q117	2SA1365-T2G	CHIP TRANSISTOR
	OR	2SA1036KT-97R	CHIP TRANSISTOR
	OR	2SB624-T2BBV5	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	Q118	2SA1365-T2G	CHIP TRANSISTOR
	OR	2SA1036KT-97R	CHIP TRANSISTOR
	OR	2SB624-T2BBV5	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	Q119	2SK621	CHIP DIGITAL FET
	Q120	2SK621	CHIP DIGITAL FET
	Q121	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q122	2SD601	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	D101	DA204K	CHIP DIODE
	D102	–	–
	D103	–	–
	D104	DAP202K	CHIP DIODE
	R101	QRSA08J-103YN	CHIP R
	R102	QRSA08J-103YN	CHIP R
	R103	–	–
	R104	–	–
	R105	PU59237-224	CHIP VR, PB SW POINT
	OR	PU57816-2-224	CHIP VR
	OR	QVZ3606-224	CHIP VR
	OR	PU59456-224	CHIP VR
	R106	QRSA08J-184YN	CHIP R
	R107	–	–
	R108	QRSA08J-104YN	CHIP R
	R109	PU59237-683	CHIP VR, REC SW POINT
	OR	PU57816-2-683	CHIP VR
	OR	PU59456-683	CHIP VR
	R110	QRSA08J-104YN	CHIP R
	R111	PU59237-683	CHIP VR, EP CTL DELAY
	OR	PU57816-2-683	CHIP VR
	OR	PU59456-683	CHIP VR
	R112	QRSA08J-124YN	CHIP R
	R113	PU59237-683	CHIP VR, SP CTL DELAY
	OR	PU57816-2-683	CHIP VR
	OR	PU59456-683	CHIP VR
	R114	QRSA08J-124YN	CHIP R
	R115	–	–
	R118	–	–
	R119	–	–
	R120	QRSA08J-473YN	CHIP R
	R121	QRSA08F-224YN	CHIP R
	R122	QRSA08F-153YN	CHIP R
	R123	QRSA08J-104YN	CHIP R
	R124	QRSA08J-334YN	CHIP R
	R125	QRSA08J-102YN	CHIP R
	R126	–	–
	R127	–	–
	R128	QRSA08J-561YN	CHIP R
	R129	QRSA08J-105YN	CHIP R
	R130	QRSA08J-104YN	CHIP R
	R131	QRSA08J-221YN	CHIP R
	R132	QRSA08J-102YN	CHIP R
	R133	QRSA08J-105YN	CHIP R
	R134	QRSA08J-223YN	CHIP R
	R135	QRSA08J-102YN	CHIP R
	R136	QRSA08J-103YN	CHIP R

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	R137	QRSA08J-103YN	CHIP R
	R138	–	–
	R139	–	–
	R140	–	–
	R141	–	–
	R142	–	–
	R143	–	–
	R144	–	–
	R145	–	–
	R146	–	–
	R147	–	–
	R148	–	–
	R149	QRSA08J-105YN	CHIP R
	R150	QRSA08J-224YN	CHIP R
	R151	QRSA08J-683YN	CHIP R
	R152	QRSA08J-223YN	CHIP R
	R153	–	–
	R154	QRSA08J-105YN	CHIP R
	R155	QRSA08J-224YN	CHIP R
	R156	–	–
	R157	QRSA08J-103YN	CHIP R
	R158	QRSA08J-105YN	CHIP R
	R159	QRSA08J-224YN	CHIP R
	R160	QRSA08J-473YN	CHIP R
	R161	QRSA08J-393YN	CHIP R
	R162	QRSA08J-105YN	CHIP R
	R163	QRSA08J-154YN	CHIP R
	R164	QRSA08J-334YN	CHIP R
	R165	QRSA08J-184YN	CHIP R
	R166	QRSA08J-334YN	CHIP R
	R167	QRSA08J-104YN	CHIP R
	R168	QRSA08J-563YN	CHIP R
	R169	QRSA08J-104YN	CHIP R
	R170	QRSA08J-474YN	CHIP R
	R171	–	–
	R172	–	–
	R173	–	–
	R174	QRSA08J-182YN	CHIP R
	R175	QRSA08J-221YN	CHIP R
	R176	QRSA08J-221YN	CHIP R
	R177	QRSA08J-472YN	CHIP R
	R178	QRSA08J-183YN	CHIP R
	R179	QRSA08J-333YN	CHIP R
	R180	QRSA08J-183YN	CHIP R
	R181	QRSA08J-223YN	CHIP R
	R182	QVZ3606-333	CHIP VR, TRACKING PRESET
	R183	QRSA08J-102YN	CHIP R
	R184	QRSA08J-102YN	CHIP R
	R185	PU56399-4	VR, TRACKING VR, 500 K
	R186	–	–
	R187	PU59237-333	CHIP VR, CAP. SAMPLING
	OR	PU57816-2-333	CHIP VR
	OR	PU59456-333	CHIP VR
	R188	QRSA08J-153YN	CHIP R
	R189	QRSA08J-822YN	CHIP R
	R190	QRSA08J-333YN	CHIP R
	R191	–	–
	R192	QRSA08J-102YN	CHIP R
	R193	QRSA08J-473YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R194	QRSA08J-105YN	CHIP R
	R195	QRSA08J-105YN	CHIP R
	R196	QRSA08J-103YN	CHIP R
	R197	QRSA08J-223YN	CHIP R
	R198	QRSA08J-822YN	CHIP R
	R199	QRSA08J-103YN	CHIP R
	R200	QRSA08J-103YN	CHIP R
	R201	QRSA08J-103YN	CHIP R
	R202	QRSA08K-4R7YN	CHIP R
	R203	QRSA08K-4R7YN	CHIP R
	R204	QRSA08J-181YN	CHIP R
	R205	QRSA08J-181YN	CHIP R
	R206	QRSA08K-4R7YN	CHIP R
	R207	QRSA08K-4R7YN	CHIP R
	R208	QRSA08J-102YN	CHIP R
	R209	–	–
	R210	QRSA08J-103YN	CHIP R
	R211	QRSA08J-223YN	CHIP R
	R212	QRSA08J-102YN	CHIP R
	R213	QRSA08J-104YN	CHIP R
	R214	QRSA08J-472YN	CHIP R
	R215	–	–
	R216	QRSA08J-0R0Y	CHIP R
	R217	–	–
	R218	PU59237-103	CHIP VR, DRUM PULSE
	OR	PU57816-2-103	CHIP VR
	OR	PU59456-103	CHIP VR
	R219	–	–
	R220	–	–
	R221	–	–
	R222	–	–
	R223	QRSA08J-223YN	CHIP R
	R224	–	–
	R225	–	–
	R226	QRSA08J-332YN	CHIP R
	R227	QRSA08J-332YN	CHIP R
	R228	QRSA08J-332YN	CHIP R
	R229	QRSA08J-332YN	CHIP R
	TH101	ERT-D2FIK-154S	THERMISTOR
	B101	QRSA08J-0R0Y	CHIP R
	B102	–	–
	B103	–	–
	B104	QRSA08J-0R0Y	CHIP R
	B105	QRD161J-0R0	CR
	C101	QCYA1HK-103	CHIP CAP
	C102	QCYA1HK-103	CHIP CAP
	C103	QER41EM-475	E CAP
	C104	QFN41HJ-682	MY CAP
	C105	QER41EM-475	E CAP
	C106	QCSA1HJ-391	CHIP CAP
	C107	QFJ41HJ-273	MY CAP
	C108	QFZ9011-224	MP CAP
	C109	QFG42AJ-333	PP CAP
	C110	QFZ9011-124	MP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C111	QEE81AM-226	T CAP
	C112	QFJ41HJ-683	MY CAP
	C113	QFZ9011-104	MP CAP
	C114	QFJ41HJ-223	MY CAP
	C115	QCDA1EM-333	CHIP CAP
	C116	QCSA1HJ-391	CHIP CAP
	C117	QCYA1HK-102	CHIP CAP
	C118	QCSA1HJ-681	CHIP CAP
	C119	QER40JM-107	E CAP
	C120	QER41CM-106	E CAP
	C121	QCSA1HJ-221	CHIP CAP
	C122	QER41HM-105	E CAP
	C123	QCYA1HK-103	CHIP CAP
	C124	QER40JM-476	E CAP
	C125	QCYA1HK-102	CHIP CAP
	C126	QCFA1EZ-104	CHIP CAP
	C127	QER40JM-476	E CAP
	C128	–	–
	C129	–	–
	C130	–	–
	C131	–	–
	C132	–	–
	C133	–	–
	C134	–	–
	C135	–	–
	C136	QEL41EM-475	E CAP
	C137	QEL41EM-475	E CAP
	C138	–	–
	C139	QFZ0095-104	MP CAP
	C140	–	–
	C141	QEL40CM-106	E CAP
	C142	QEL40CM-106	E CAP
	C143	QFZ9011-334	MP CAP
	C144	QCFA1EZ-104	CHIP CAP
	C145	QER40JM-476	E CAP
	C146	QER41CM-106	E CAP
	C147	QER41CM-106	E CAP
	C148	QER40JM-476	E CAP
	C149	QFZ0095-393	MP CAP
	C150	QFZ0096-104	MP CAP
	OR	QFZ0095-104	MP CAP
	C151	QER41HM-105	E CAP
	C152	–	–
	C153	QCYA1HK-102	CHIP CAP
	C154	QER41HM-225	E CAP
	C155	QCSA1HJ-331	CHIP CAP
	C156	QCSA1HJ-101	CHIP CAP
	C157	QCFA1EZ-104	CHIP CAP
	C158	QCFA1EZ-104	CHIP CAP
	C159	QEPA1CM-106	NP CAP
	C160	–	–
	C161	QCYA1HK-102	CHIP CAP
	C162	–	–
	C163	QCYA1HK-332	CHIP CAP
	C164	QCYA1EK-223	CHIP CAP
	C165	QCYA1EK-223	CHIP CAP
	C166	QCYA1EK-223	CHIP CAP
	C167	QCYA1HK-102	CHIP CAP
	C168	QCSA1HJ-151	CHIP CAP
	C169	QCFA1EZ-104	CHIP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	X'TAL 1	PU47701	CRYSTAL
	TP	PU56278	TEST PIN, TP101–117
	– AUDIO SECTION –		
	IC301	AN3991NS	FLAT IC
	IC302	7VT10	INTEGRATED CIRCUIT
	Q301	–	–
	Q302	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q303	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q304	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q305	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q306	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q307	2SD601	CHIP TRANSISTOR
	Q308	2SD601	CHIP TRANSISTOR
	Q309	2SB709	CHIP TRANSISTOR
	Q310	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	Q311	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q312	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	R301	QRSA08J-220YN	CHIP R
	R302	QRSA08J-103YN	CHIP R
	R303	QRSA08J-153YN	CHIP R
	R304	QRSA08J-223YN	CHIP R
	R305	QRSA08J-223YN	CHIP R
	R306	QRSA08J-121YN	CHIP R
	R307	QRSA08J-822YN	CHIP R
	R308	QRSA08J-103YN	CHIP R
	R309	QRSA08J-0R0Y	CHIP R
	R310	QRSA08J-0R0Y	CHIP R
	R311	QRSA08J-122YN	CHIP R
	R312	QRSA08J-561YN	CHIP R
	R313	QRSA08J-181YN	CHIP R
	R314	PU59237-103	CHIP VR, AUDIO REC LEVEL
	OR	PU57816-2-103	CHIP VR
	OR	PU59456-103	CHIP VR
	R315	QRSA08J-682YN	CHIP R
	R316	QRSA08J-472YN	CHIP R
	R317	QRSA08J-392YN	CHIP R
	R318	QRSA08J-103YN	CHIP R
	R319	QRSA08J-222YN	CHIP R
	R320	QRSA08J-0R0Y	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R321	QRSA08J-681YN	CHIP R
	R322	PU59237-222	CHIP VR, AUDIO PB LEVEL
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R323	QRSA08J-392YN	CHIP R
	R324	QRSA08J-124YN	CHIP R
	R325	QRSA08J-221YN	CHIP R
	R326	QRSA08J-103YN	CHIP R
	R327	QRSA08J-273YN	CHIP R
	R328	QRSA08J-102YN	CHIP R
	R329	QRSA08J-222YN	CHIP R
	R330	–	–
	R331	–	–
	R332	–	–
	R333	QRSA08J-105YN	CHIP R
	R334	QRSA08J-103YN	CHIP R
	R335	QRSA08J-560YN	CHIP R
	R336	QRSA08J-103YN	CHIP R
	R337	QRSA08J-102YN	CHIP R
	R338	QRSA08J-392YN	CHIP R
	R339	QRSA08J-102YN	CHIP R
	R340	QRSA08J-823YN	CHIP R
	R341	QRSA08J-103YN	CHIP R
	R342	–	–
	R343	–	–
	R344	QVZ3606-683	CHIP VR, AUDIO BIAS LEVEL
	R345	QRSA08J-100YN	CHIP R
	R346	QRSA08J-123YN	CHIP R
	R347	–	–
	R348	QRSA08J-0R0Y	CHIP R
	R349	QRSA08J-103YN	CHIP R
	R350	QRSA08J-122YN	CHIP R
	R351	–	–
	R352	–	–
	R353	QRD163J-0R0	CR
	R354	QRD163J-0R0	CR
	C301	QER40JM-476	E CAP
	C302	–	–
	C303	QER41EM-335	E CAP
	C304	QER40JM-226	E CAP
	C305	QCSA1HJ-121	CHIP CAP
	C306	QER41HM-474	E CAP
	C307	QCYA1HK-332	CHIP CAP
	C308	QFZ9011-563	MP CAP
	C309	QCYA1HK-103	CHIP CAP
	C310	QER41EM-335	E CAP
	C311	QER41EM-335	E CAP
	C312	QER41HM-474	E CAP
	C313	QER41CM-106	E CAP
	C314	QCYA1EK-223	CHIP CAP
	C315	QER41HM-474	E CAP
	C316	QER41CM-106	E CAP
	C317	QER41HM-474	E CAP
	C318	QER40JM-336	E CAP
	C319	QCYA1HK-392	CHIP CAP
	C320	QCSA1HJ-681	CHIP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C321	–	–
	C322	–	–
	C323	QER41HM-104	E CAP
	C324	–	–
	C325	QER41HM-225	E CAP
	C326	QER40JM-226	E CAP
	C327	QER41HM-225	E CAP
	C328	QER40JM-226	E CAP
	C329	QCSA1HJ-471	CHIP CAP
	C330	QCSA1HJ-471	CHIP CAP
	C331	QER41AM-336	E CAP
	C332	QFZ9011-823	MP CAP
	C333	QCSA1HJ-471	CHIP CAP
	C334	QCYA1HK-822	CHIP CAP
	C335	–	–
	C336	QER41HM-224	E CAP
	L301	PU56197-2	EQUALIZER
	L302	PU58610	TRAP COIL
	L303	PU55843-331K	CHIP COIL
	L304	PU58611	OSC COIL
	L305	PU55843-101K	CHIP COIL
	TP	PU56278	TEST PIN, TP302–305
	– MECHACON SECTION –		
⚠	IC401	HD6305Y0A76F	FLAT IC
	IC402	–	–
	IC403	MN74HC244S	FLAT IC
	OR	SN74HC244NS	FLAT IC
	IC404	MN74HC244S	FLAT IC
	OR	SN74HC244NS	FLAT IC
	IC405	MN74HC244S	FLAT IC
	OR	SN74HC244NS	FLAT IC
	IC406	BA6109U2	INTEGRATED CIRCUIT
	IC407	AN6564NS	FLAT IC
	IC408	MN4071BS	FLAT IC
	IC409	MN4069UBS	FLAT IC
	IC410	MN4011BS	FLAT IC
	IC411	MN4081BS	FLAT IC
	Q401	–	–
	Q402	2SK621	CHIP DIGITAL FET
	Q403	2SK621	CHIP DIGITAL FET
	Q404	2SK621	CHIP DIGITAL FET
	Q405	2SK621	CHIP DIGITAL FET
	Q406	2SK621	CHIP DIGITAL FET
	Q407	2SK621	CHIP DIGITAL FET
	Q408	2SK621	CHIP DIGITAL FET
	Q409	2SK621	CHIP DIGITAL FET
	Q410	2SK621	CHIP DIGITAL FET
	Q411	2SK621	CHIP DIGITAL FET
	Q412	2SK621	CHIP DIGITAL FET
	Q413	2SB709	CHIP TRANSISTOR

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	D401	MA151WK	CHIP DIODE
	D402	MA151WA	CHIP DIODE
	D403	MA151WA	CHIP DIODE
	D404	MA151A	CHIP DIODE
	D405	–	–
	D406	–	–
	D407	MA3075M	CHIP ZENER DIODE
	OR	MA3075H	CHIP ZENER DIODE
	OR	RD7.5M-T1B2	CHIP ZENER DIODE
	OR	RD7.5M-T1B3	CHIP ZENER DIODE
	D408	MA151WA	CHIP DIODE
	R401	QRSA08J-153YN	CHIP R
	R402	QRSA08J-153YN	CHIP R
	R403	QRSA08J-153YN	CHIP R
	R404	QRSA08J-103YN	CHIP R
	R405	QRSA08J-103YN	CHIP R
	R406	QRSA08J-223YN	CHIP R
	R407	QRSA08J-153YN	CHIP R
	R408	–	–
	R409	–	–
	R410	–	–
	R411	QRSA08J-102YN	CHIP R
	R412	QRSA08J-102YN	CHIP R
	R413	QRSA08J-102YN	CHIP R
	R414	QRSA08J-105YN	CHIP R
	R415	QRSA08J-104YN	CHIP R
	R416	QRSA08J-104YN	CHIP R
	R417	QRSA08J-104YN	CHIP R
	R418	QRSA08J-104YN	CHIP R
	R419	QRSA08J-104YN	CHIP R
	R420	QRSA08J-104YN	CHIP R
	R421	QRSA08J-104YN	CHIP R
	R422	QRSA08J-104YN	CHIP R
	R423	QRSA08J-474YN	CHIP R
	R424	QRSA08J-105YN	CHIP R
	R425	QRSA08J-153YN	CHIP R
	R426	QRSA08J-102YN	CHIP R
	R427	QRSA08J-153YN	CHIP R
	R428	QRSA08J-153YN	CHIP R
	R429	QRSA08J-102YN	CHIP R
	R430	QRSA08J-102YN	CHIP R
	R431	QRSA08J-105YN	CHIP R
	R432	–	–
	R433	QRSA08J-474YN	CHIP R
	R434	QRSA08J-123YN	CHIP R
	R435	QRSA08J-224YN	CHIP R
	R436	PU59237-154	CHIP VR, BATTERY ALARM
	OR	PU57816-2-154	CHIP VR
	OR	PU59456-154	CHIP VR
	R437	QRSA08J-184YN	CHIP R
	R438	QRSA08J-474YN	CHIP R
	R439	QRSA08J-823YN	CHIP R
	R440	QRSA08K-475YN	CHIP R
	R441	QRSA08J-103YN	CHIP R
	R442	QRSA08J-105YN	CHIP R
	R443	QRSA08J-103YN	CHIP R
	R444	QRSA08J-103YN	CHIP R
	R445	QRSA08J-104YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R446	QRSA08J-181YN	CHIP R
	R447	QRSA08J-105YN	CHIP R
	R448	QRSA08J-684YN	CHIP R
	R449	QRSA08J-105YN	CHIP R
	R450	QRSA08J-102YN	CHIP R
	R451	QRSA08J-105YN	CHIP R
	R452	QRSA08J-125YN	CHIP R
	R453	QRSA08J-105YN	CHIP R
	R454	–	–
	R455	QRSA08J-153YN	CHIP R
	R456	QRSA08J-153YN	CHIP R
	R457	QRSA08J-153YN	CHIP R
	R458	–	–
	R459	QRSA08J-102YN	CHIP R
	R460	–	–
	R461	QRSA08J-102YN	CHIP R
	R462	QRSA08J-102YN	CHIP R
	R463	QRSA08J-102YN	CHIP R
	R464	QRSA08J-564YN	CHIP R
	R465	QRSA08J-104YN	CHIP R
	R466	QRSA08J-225YN	CHIP R
	R467	QRSA08J-102YN	CHIP R
	R468	QRSA08J-104YN	CHIP R
	R469	QRSA08J-102YN	CHIP R
	R470	QRSA08J-104YN	CHIP R
	R471	QRSA08J-102YN	CHIP R
	R472	QRSA08J-104YN	CHIP R
	R473	QRSA08J-102YN	CHIP R
	R474	QRSA08J-104YN	CHIP R
	R475	QRSA08J-102YN	CHIP R
	R476	–	–
	R477	QRSA08J-104YN	CHIP R
	R478	QRSA08J-104YN	CHIP R
	R479	QRSA08J-222YN	CHIP R
	R480	QRSA08J-102YN	CHIP R
	R481	QRSA08J-102YN	CHIP R
	R482	QRSA08J-102YN	CHIP R
	R483	QRSA08J-102YN	CHIP R
	R484	QRSA08J-102YN	CHIP R
	R485	QRSA08J-102YN	CHIP R
	R486	QRSA08J-102YN	CHIP R
	R487	QRSA08J-102YN	CHIP R
	R488	QRSA08J-103YN	CHIP R
	R489	QRSA08J-103YN	CHIP R
	R490	QRSA08J-103YN	CHIP R
	R491	QRSA08J-103YN	CHIP R
	R492	QRSA08J-472YN	CHIP R
	R493	QRSA08J-472YN	CHIP R
	R494	QRSA08J-103YN	CHIP R
	R495	QRSA08J-103YN	CHIP R
	R496	QRSA08J-102YN	CHIP R
	R497	QRDA08J-103YN	CHIP R
	R498	QRSA08J-223YN	CHIP R
	R499	QRSA08J-103YN	CHIP R
	R500	QRSA08J-223YN	CHIP R
	R501	QRSA08J-103YN	CHIP R
	R502	QRSA08J-223YN	CHIP R
	R503	QRSA08J-103YN	CHIP R
	R504	QRSA08J-223YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R505	QRSA08J-103YN	CHIP R
	R506	QRSA08J-102YN	CHIP R
	R507	QRSA08J-102YN	CHIP R
	R508	QRSA08J-102YN	CHIP R
	R509	QRSA08J-102YN	CHIP R
	R510	QRSA08J-125YN	CHIP R
	R511	QRSA08J-102YN	CHIP R
	R512	QRSA08J-102YN	CHIP R
	R513	QRSA08J-102YN	CHIP R
	R514	QRSA08J-271YN	CHIP R
	R515	QRSA08J-102YN	CHIP R
	C401	QCFA1EZ-104	CHIP CAP
	C402	QCFA1EZ-104	CHIP CAP
	C403	–	–
	C404	–	–
	C405	–	–
	C406	QCFA1HZ-473	CHIP CAP
	C407	QCYA1HK-222	CHIP CAP
	C408	–	–
	C409	–	–
	C410	–	–
	C411	–	–
	C412	QCFA1EZ-104	CHIP CAP
	C413	QER41HM-105	E CAP
	C414	QCSA1HJ-270	CHIP CAP
	C415	QCSA1HJ-270	CHIP CAP
	C416	QCFA1EZ-104	CHIP CAP
	C417	QEF81AM-475	CHIP T CAP
	C418	QCYA1HK-103	CHIP CAP
	C419	QCFA1EZ-104	CHIP CAP
	C420	QCSA1HJ-561	CHIP CAP
	L401	PU59188-101K	CHIP COIL
	CF401	PU58780	CERAMIC FILTER
⚠	TH401	PU52108-2R2	POSISTOR
	TP	PU56278	TEST PIN, TP401
	SLD1	PQ42544	INSULATOR
	CN1	PU58655-3	CAP. HOUSING
	CN2	PU58655-3	CAP. HOUSING
	CN3	PU58655-2	CAP. HOUSING
	CN4	PU58655-4	CAP. HOUSING
	CN5A	PU58655-7	CAP. HOUSING
	CN6	PU58655-2	CAP. HOUSING
	CN7	PU58250-8	CAP. HOUSING
	CN8	PU58250-10	CAP. HOUSING
	CN9	PU58250-16	CAP. HOUSING

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	CN10A	PU58655-5	CAP. HOUSING
	CN10B	PU58253-7	CAP. HOUSING
	CN11	PU58250-10	CAP. HOUSING
	CN12	PU58250-10	CAP. HOUSING
	CN13	PU58655-7	CAP. HOUSING
	CN14	PU58655-2	CAP. HOUSING
	CN15	PU58655-3	CAP. HOUSING
	CN16	PU58655-2	CAP. HOUSING
	CN17	PU58655-5	CAP. HOUSING
	CN18	PU58655-14	CAP. HOUSING
	CN19	PU58655-4	CAP. HOUSING
	CN20	PU58655-4	CAP. HOUSING
	CN21	PU58655-3	CAP. HOUSING
		PU36285A-C	TRACK SHIFT BOARD ASS'Y (NOT INCLUDED IN PU11348E-2-C OF MAIN BOARD ASS'Y)
	IC109	M5223FP	FLAT IC
	OR	UPC1251G	FLAT IC
	Q128	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q129	2SK621	CHIP DIGITAL FET
	R116	QRSA08J-184YN	CHIP R
	R117	QRSA08J-105YN	CHIP R
	R235	QRSA08J-273YN	CHIP R
	R236	QRSA08J-123YN	CHIP R
	R237	QRSA08J-102YN	CHIP R
	R238	QRSA08J-103YN	CHIP R
	B106	QRSA08J-0R0Y	CHIP R
	B107	QRD161J-0R0	CR

		PU11506A1-02-C	Y/C BOARD ASS'Y [02]
	IC1	AN3212S	FLAT IC
	IC2	H8D7025	INTEGRATED CIRCUIT
	IC3	AN3323S	FLAT IC
	IC4	H8DN7026	INTEGRATED CIRCUIT
	IC5	BX7383	INTEGRATED CIRCUIT
	IC6	BA7241F	FLAT IC
	IC7	H8D7004B	FLAT IC
	IC8	H8D1927A	INTEGRATED CIRCUIT
	IC9	H8D7027	INTEGRATED CIRCUIT
	IC10	THE045A	INTEGRATED CIRCUIT
	IC11	BA7131F	FLAT IC
	Q1	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q2	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q3	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q4	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q5	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q6	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q7	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q8	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q9	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q10	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q11	DTC114YK	CHIP DIGITAL TRANSISTOR
	Q12	–	–
	Q13	–	–
	Q14	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	D1	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	D2	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	D3	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	D4	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	D5	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	D6	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	D7	DAN202K	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	R1	PU59237-102	CHIP VR, REC FM LEVEL
	OR	PU59456-102	CHIP VR
	R2	PU59237-473	CHIP VR, WHITE CLIP
	OR	PU59456-473	CHIP VR
	R3	PU59237-473	CHIP VR, DARK CLIP
	OR	PU59456-473	CHIP VR
	R4	PU59237-153	CHIP VR, CARRIER
	OR	PU59456-153	CHIP VR
	R5	PU59237-103	CHIP VR, DEVIATION
	OR	PU59456-103	CHIP VR
	R6	PU59237-222	CHIP VR, NOISE CANCEL
	OR	PU59456-222	CHIP VR
	R7	PU59237-473	CHIP VR, Y LEVEL
	OR	PU59456-473	CHIP VR
	R8	PU59237-473	CHIP VR, REC GAIN
	OR	PU59456-473	CHIP VR

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R9	PU59237-102	CHIP VR, EE Y LEVEL
	OR	PU59456-102	CHIP VR
	R10	PU59237-222	CHIP VR, VIDEO EQ
	OR	PU59456-222	CHIP VR
	R11	PU59237-102	CHIP VR, EE BURST LEVEL
	OR	PU59456-102	CHIP VR
	R12	PU59237-681	CHIP VR, REC COLOUR LEVEL
	OR	PU59456-681	CHIP VR
	R13	PU59237-102	CHIP VR, BURST LEVEL
	OR	PU59456-102	CHIP VR
	R14	PU59237-473	CHIP VR, AFC
	R15	PU59237-102	CHIP VR, PB COLOUR LEVEL
	OR	PU59456-102	CHIP VR
	R16	QRSA08J-222YN	CHIP R
	R17	QRSA08J-821YN	CHIP R
	R18	QRSA08J-103YN	CHIP R
	R19	QRSA08J-682YN	CHIP R
	R20	QRSA08J-680YN	CHIP R
	R21	QRSA08J-473YN	CHIP R
	R22	QRSA08J-152YN	CHIP R
	R23	QRSA08J-562YN	CHIP R
	R24	QRSA08J-332YN	CHIP R
	R25	QRSA08J-821YN	CHIP R
	R26	QRSA08J-562YN	CHIP R
	R27	QRSA08J-272YN	CHIP R
	R28	QRSA08J-393YN	CHIP R
	R29	QRSA08J-223YN	CHIP R
	R30	QRSA08J-102YN	CHIP R
	R31	QRSA08J-223YN	CHIP R
	R32	QRSA08J-332YN	CHIP R
	R33	QRSA08J-681YN	CHIP R
	R34	–	–
	R35	QRSA08J-822YN	CHIP R
	R36	QRSA08J-102YN	CHIP R
	R37	QRSA08J-561YN	CHIP R
	R38	QRSA08J-471YN	CHIP R
	R39	QRSA08J-471YN	CHIP R
	R40	QRSA08J-153YN	CHIP R
	R41	QRSA08J-562YN	CHIP R
	R42	QRSA08J-182YN	CHIP R
	R43	QRSA08J-222YN	CHIP R
	R44	QRSA08J-122YN	CHIP R
	R45	QRSA08J-272YN	CHIP R
	R46	QRSA08J-103YN	CHIP R
	R47	QRSA08J-103YN	CHIP R
	R48	QRSA08J-333YN	CHIP R
	R49	QRSA08J-473YN	CHIP R
	R50	QRSA08J-222YN	CHIP R
	R51	QRSA08J-393YN	CHIP R
	R52	QRSA08J-393YN	CHIP R
	R53	QRSA08J-0R0Y	CHIP R
	R54	QRSA08J-122YN	CHIP R
	R55	QRSA08J-122YN	CHIP R
	R56	QRSA08J-102YN	CHIP R
	R57	QRSA08J-0R0Y	CHIP R
	R58	QRSA08J-102YN	CHIP R
	R59	QRSA08J-331YN	CHIP R
	R60	QRSA08J-102YN	CHIP R
	R61	QRSA08J-0R0Y	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R62	QRSA08J-103YN	CHIP R
	R63	QRSA08J-152YN	CHIP R
	R64	QRSA08J-103YN	CHIP R
	R65	QRSA08J-102YN	CHIP R
	R66	QRSA08J-332YN	CHIP R
	R67	QRSA08J-103YN	CHIP R
	R68	QRSA08J-103YN	CHIP R
	R69	QRSA08J-471YN	CHIP R
	R70	QRSA08J-153YN	CHIP R
	R71	–	–
	R72	QRSA08J-682YN	CHIP R
	R73	QRSA08J-0R0Y	CHIP R
	R74	QRSA08J-0R0Y	CHIP R
	R75	QRSA08J-0R0Y	CHIP R
	R76	QRSA08J-0R0Y	CHIP R
	R77	QRSA08J-0R0Y	CHIP R
	R78	QRSA08J-0R0Y	CHIP R
	R79	QRSA08J-0R0Y	CHIP R
	R80	QRSA08J-223YN	CHIP R
	R81	QRSA08J-153YN	CHIP R
	R82	QRSA08J-122YN	CHIP R
	R83	QRSA08J-102YN	CHIP R
	R84	QRSA08J-122YN	CHIP R
	R85	QRSA08J-393YN	CHIP R
	R86	QRSA08J-102YN	CHIP R
	R87	QRSA08J-152YN	CHIP R
	R88	QRSA08J-0R0Y	CHIP R
	R89	QRSA08J-0R0Y	CHIP R
	R90	QRSA08J-0R0Y	CHIP R
	R91	QRSA08J-0R0Y	CHIP R
	R92	QRSA08J-0R0Y	CHIP R
	R93	QRSA08J-223YN	CHIP R
	C1	ECEV1HV3R3	CHIP E CAP
	C2	QCYA1HK-103	CHIP CAP
	C3	QCYA1HK-103	CHIP CAP
	C4	QCSA1HJ-151	CHIP CAP
	C5	QCYA1HK-103	CHIP CAP
	C6	QCSA1HJ-5R0	CHIP CAP
	C7	QCTA1CH-390	CHIP CAP
	C8	QEF80JM-476	CHIP T CAP
	C9	QCSA1HJ-181	CHIP CAP
	C10	QEF80JM-225	CHIP T CAP
	C11	QCYA1EK-223	CHIP CAP
	C12	QCSA1HJ-391	CHIP CAP
	C13	QCSA1HJ-471	CHIP CAP
	C14	QCSA1HJ-151	CHIP CAP
	C15	QCYA1HK-103	CHIP CAP
	C16	QCYA1HK-222	CHIP CAP
	C17	QEF80JM-225	CHIP T CAP
	C18	QEF80JM-475	CHIP T CAP
	C19	ECEV0JV220	CHIP E CAP
	C20	QEF81AM-335	CHIP T CAP
	C21	QCSA1HJ-680	CHIP CAP
	C22	QEF81AM-105	CHIP T CAP
	C23	QCYA1HK-103	CHIP CAP
	C24	QCSA1HJ-270	CHIP CAP
	C25	QCYA1HK-103	CHIP CAP
	C26	QCYA1HK-103	CHIP CAP

#	⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		C27	QCYA1HK-103	CHIP CAP
		C28	QCSA1HJ-390	CHIP CAP
		C29	QCYA1HK-103	CHIP CAP
		C30	QCSA1HJ-120	CHIP CAP
		C31	QCYA1HK-103	CHIP CAP
		C32	QCYA1HK-103	CHIP CAP
		C33	QCYA1EK-223	CHIP CAP
		C34	QCYA1HK-103	CHIP CAP
		C35	ECEV0JV220	CHIP E CAP
		C36	QCYA1HK-103	CHIP CAP
		C37	QCYA1EK-223	CHIP CAP
		C38	QCYA1HK-103	CHIP CAP
		C39	ECEV1CV100	CHIP E CAP
		C40	QEF80JM-475	CHIP T CAP
		C41	QER41CM-106	E CAP
		C42	ECEV1CV100	CHIP E CAP
		C43	QCYA1HK-103	CHIP CAP
		C44	ECEV1CV100	CHIP E CAP
		C45	ECEV0JV220	CHIP E CAP
		C46	QCYA1HK-103	CHIP CAP
		C47	QCYA1HK-103	CHIP CAP
		C48	ECEV1CV100	CHIP E CAP
		C49	QEF81AM-105	CHIP T CAP
		C50	QCSA1HJ-470	CHIP CAP
		C51	ECEV1CV100	CHIP E CAP
		C52	QCSA1HJ-560	CHIP CAP
		C53	QCSA1HJ-680	CHIP CAP
		C54	QCYA1HK-103	CHIP CAP
		C55	QCYA1HK-103	CHIP CAP
		C56	QCYA1HK-103	CHIP CAP
		C57	QCSA1HJ-330	CHIP CAP
		C58	QCYA1HK-103	CHIP CAP
		C59	PU56274B-200	CHIP TR CAP
		C60	QCYA1HK-103	CHIP CAP
		C61	QCYA1HK-103	CHIP CAP
		C62	QCYA1HK-103	CHIP CAP
		C63	ECEV0JV220	CHIP E CAP
		C64	QEF81AM-105	CHIP T CAP
		C65	–	–
		C66	QEF81AM-105	CHIP T CAP
		C67	–	–
		C68	QCYA1HK-103	CHIP CAP
	⚠	L1	PU59449-101J	CHIP COIL
	⚠	L2	PU59449-101J	CHIP COIL
	⚠	L3	PU59449-120J	CHIP COIL
	⚠	L4	PU59449-101J	CHIP COIL
		L5	–	–
		L6	PU58627-680J	CHIP COIL
		OR	PU58201-680J	CHIP COIL
		L7	PU58627-680J	CHIP COIL
		OR	PU58201-680J	CHIP COIL
		L8	PU58627-270J	CHIP COIL
		OR	PU58201-270J	CHIP COIL
	⚠	L9	PU59449-101J	CHIP COIL
		L10	PU58627-101K	CHIP COIL
		OR	PU58201-101K	CHIP COIL
		L11	–	–

#	⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	⚠	L12	PU58627-101K	CHIP COIL
	⚠	OR	PU58201-101K	CHIP COIL
	⚠	L13	PU58627-101K	CHIP COIL
	⚠	OR	PU58201-101K	CHIP COIL
		L14	PU58627-220J	CHIP COIL
		OR	PU58201-220J	CHIP COIL
		DL1	PU59472	1H DELAY LINE
		DL2	PU59473	2H COMB FILTER
		LPF1	PU59474-3	CHIP LOW PASS FILTER
		LPF2	PU59475-2	CHIP LOW PASS FILTER
		LPF3	PU59476-2	CHIP LOW PASS FILTER
		HPF1	PU59479-3	CHIP HIGH PASS FILTER
		BPF1	PU59477	CHIP BAND PASS FILTER
		BPF2	PU59478	CHIP BAND PASS FILTER
		EQ1	PU59480-3	CHIP EQUALIZER
		EQ2	PU59031	FH TRAP COIL
	⚠	X1	PU31449-2	CRYSTAL
		TP	PU56278	TEST PIN, TP1 – 15
		SPC1	PQ42625	SPACER
		CN1	PU58655-2	CAP. HOUSING
		CN2	PU58655-2	CHP. HOUSING
		CN3	PU58251-10	CAP. HOUSING
		CN4	PU58251-10	CAP. HOUSING
		CN5	PU59636-12	CAP. HOUSING
			–	S/S BOARD ASS'Y (INCLUDED IN PU11506A1-02-C OF Y/C BOARD ASS'Y)
		Q12	2SA1037K	CHIP TRANSISTOR
		Q13	DTC144EK	CHIP DIGITAL TRANSISTOR
		R95	QRSA08J-684YN	CHIP R
		R96	QRSA08J-473YN	CHIP R

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	R97	QRSA08J-473YN	CHIP R
	R98	QRSA08J-103YN	CHIP R
	R99	QRSA08J-155YN	CHIP R
	R100	QRSA08J-0R0Y	CHIP R
		–	APC BOARD ASS'Y (INCLUDED IN PU11506A1-02-C OF Y/C BOARD ASS'Y)
	D8	DAN202K	CHIP DIODE
	D9	DAN202K	CHIP DIODE
	R94	QRSA08J-103YN	CHIP R
	R101	QRSA08J-0R0Y	CHIP R
	R102	QRSA08J-0R0Y	CHIP R

		PU22200A-2-C	OPERATION BOARD ASS'Y [03]
	IC1	TMS1035NSE	FLAT IC
	IC2	MN4021BS	FLAT IC
	Q1	2SK621	CHIP DIGITAL FET
	Q2	–	–
	Q3	2SK621	CHIP DIGITAL FET
	Q4	2SK621	CHIP DIGITAL FET
	Q5	2SK621	CHIP DIGITAL FET
	Q6	–	–
	Q7	DTA144EK	CHIP DIGITAL TRANSISTOR
	Q8	2SK621	CHIP DIGITAL FET
	D1	SLN-210VC74	LED
	D2	SLN-210VC74	LED
	D3	SLN-210VC74	LED
	D4	SLN-210VC74	LED
	D5	SLN-210VC74	LED
	D6	SLN-210VC74	LED
	D7	MA151A	CHIP DIODE
	D8	DA204K	CHIP DIODE
	D9	DA204K	CHIP DIODE
	D10	–	–
	D11	RD5.6M-T1B	CHIP ZENER DIODE
	D12	RD5.6M-T2B	CHIP ZENER DIODE
	D13	–	–
	D14	MA151A	CHIP D10DE

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	R1	QRSA08J-473YN	CHIP R
	R2	QRSA08J-473YN	CHIP R
	R3	QRSA08J-473YN	CHIP R
	R4	QRSA08J-473YN	CHIP R
	R5	QRSA08J-473YN	CHIP R
	R6	QRSA08J-104YN	CHIP R
	R7	QRSA08J-473YN	CHIP R
	R8	QRSA08J-473YN	CHIP R
	R9	QRSA08J-473YN	CHIP R
	R10	QRSA08J-102YN	CHIP R
	R11	QRSA08J-102YN	CHIP R
	R12	QRSA08J-102YN	CHIP R
	R13	–	–
	R14	QRSA08J-102YN	CHIP R
	R15	QRSA08J-102YN	CHIP R
	R16	QRSA08J-104YN	CHIP R
	R17	QRSA08J-102YN	CHIP R
	R18	–	–
	R19	–	–
	R20	–	–
	R21	QRSA08J-102YN	CHIP R
	R22	QRSA08J-103YN	CHIP R
	R23	QRSA08J-102YN	CHIP R
	R24	QRSA08J-102YN	CHIP R
	R25	QRSA08J-102YN	CHIP R
	R26	QRSA08J-102YN	CHIP R
	R27	–	–
	R28	QRSA08J-333YN	CHIP R
	R29	QRSA08J-101YN	CHIP R
	R30	QRSA08J-102YN	CHIP R
	R31	QRD167J-750	CR
	R32	QRD167J-750	CR
	R33	QRSA08J-0R0Y	CHIP R
	B1	QRSA08J-0R0Y	CHIP R
	B2	QRSA08J-0R0Y	CHIP R
	B3	QRSA08J-0R0Y	CHIP R
	B4	QRSA08J-0R0Y	CHIP R
	B5	QRSA08J-0R0Y	CHIP R
	B6	QRSA08J-0R0Y	CHIP R
	B7	QRSA08J-0R0Y	CHIP R
	B8	QRSA08J-0R0Y	CHIP R
	B9	QRSA08J-0R0Y	CHIP R
	RA1	NRB042J-102N	CHIP RESISTOR ARRAY
	RA2	NRB042J-102N	CHIP RESISTOR ARRAY
	RA3	NRB042J-102N	CHIP RESISTOR ARRAY
	RA4	NRB042J-102N	CHIP RESISTOR ARRAY
	C1	QCFA1EZ-104	CHIP CAP
	C2	QEF80JM-225	CHIP T CAP
	C3	QCFA1EZ-104	CHIP CAP
	C4	–	–
	C5	–	–
	C6	QER40GM-227	E CAP
	C7	QEK40JM-337	E CAP
	C8	QEK40JM-337	E CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C9	QEK40JM-337	E CAP
	C10	QEF81AM-106	CHIP T CAP
	C11	–	–
	C12	–	–
	C13	QCFA1EZ-104	CHIP CAP
	L1	PU57620-102K	CHIP COIL
	SW1	PU57008-2	TACT SWITCH, REC STBY
	SW2	PU52930	PUSH SWITCH, REW
	SW3	PU52930	PUSH SWITCH, STOP
	SW4	PU57008-2	TACT SWITCH, MONITOR
	SW5	PU57008-2	TACT SWITCH, PLAY
	SW6	PU57008-2	TACT SWITCH, PAUSE/STILL
	SW7	PU52930	PUSH SWITCH, FF
	SW8	PU55583	SLIDE SWITCH, POWER
	SW9	PU58694	SWITCH, SP/EP
	SW10	PU56346	PUSH SWITCH, QUICK REVIEW
	JA1	PU59010	JACK
	JA2	PU59010	JACK
	CONN1	PU58988-2	A/V CONNECTOR
	LH3	PQ42539	LED HOLDER, FOR D3
	LH4	PQ42539	LED HOLDER, FOR D4
	LH5	PQ42539	LED HOLDER, FOR D5
	SH1	PU59811	SHEET
	CN1	PU58251-10	CAP. HOUSING
	CN2	PU58251-16	CAP. HOUSING
	CN3	PU58693	CAP. HOUSING

		THE043A	PRE AMP IC [04]

		PU11506A2-02-C	MDA BOARD ASS'Y [05]
	IC251	BA6450F	FLAT IC
	D251	MA151WA	CHIP DIODE
	OR	DAP202K	CHIP DIODE
	D252	MA704	CHIP ZENER DIODE

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R251	QRSA08J-102YN	CHIP R
	R252	QRSA08J-394YN	CHIP R
	R253	QRSA08J-153YN	CHIP R
	R254	QRSA08J-101YN	CHIP R
	R255	QRSA08J-473YN	CHIP R
	R256	QRSA08K-2R2YN	CHIP R
	R257	QRSA08K-2R2YN	CHIP R
	R258	QRSA08K-2R2YN	CHIP R
⚠	R259	QRG125J-R68A	OMR
	R260	–	–
	R261	–	–
	R262	QRSA08J-332YN	CHIP R
	R263	–	–
	R264	QRSA08J-471YN	CHIP R
	C251	QFZ9011-104	MP CAP
	C252	QCSA1HJ-181	CHIP CAP
	C253	QER41CM-106	E CAP
	C254	QCYA1HK-103	CHIP CAP
	C255	QER41CM-106	E CAP
	C256	QER41CM-106	E CAP
	C257	QER41CM-106	E CAP
	C258	QCFA1EZ-104	CHIP CAP
	C259	QCFA1EZ-104	CHIP CAP
	C260	–	–
	C261	QER41CM-106	E CAP
	C262	QER41CM-106	E CAP
	C263	QCFA1EZ-104	CHIP CAP
	C264	QFZ0095-104	MP CAP
	C265	QCFA1EZ-104	CHIP CAP
	L251	PU59188-101K	CHIP COIL
⚠	CP251	ICP-F10	CIRCUIT PROTECTOR
		PQ42514	COVER PLATE
	SLD1	PU58981	SHIELD COVER
	CN-M1	PU58655-13	CAP. HOUSING

		PU22428A-02-C	SKEW JUMP BOARD ASS'Y [12]
	IC1	AN3592S	FLAT IC
	IC2	MSM6989MS	FLAT IC
	IC3	TA7374P	INTEGRATED CIRCUIT
	IC4	AN8009	INTEGRATED CIRCUIT

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	Q1	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q2	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q3	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q4	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q5	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q6	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q7	2SA1037K	CHIP TRANSISTOR
	OR	2SB709	CHIP TRANSISTOR
	Q8	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q9	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q10	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q11	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q12	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q13	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q14	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	R1	QRSA08J-332YN	CHIP R
	R2	QRSA08J-391YN	CHIP R
	R3	QRSA08J-123YN	CHIP R
	R4	QRSA08J-104YN	CHIP R
	R5	QRSA08J-102YN	CHIP R
	R6	QRSA08J-473YN	CHIP R
	R7	QRSA08J-821YN	CHIP R
	R8	QRSA08J-272YN	CHIP R
	R9	QRSA08J-222YN	CHIP R
	R11	QRSA08J-223YN	CHIP R
	R12	QRSA08J-103YN	CHIP R
	R13	QRSA08J-154YN	CHIP R
	R14	QRSA08J-221YN	CHIP R
	R15	QRSA08J-393YN	CHIP R
	R16	PU59237-473	CHIP VR, 0.5 H DET
	OR	PU59456-473	CHIP VR
	R17	QRSA08J-222YN	CHIP R
	R18	QRSA08J-561YN	CHIP R
	R19	QRSA08J-561YN	CHIP R
	R20	QRSA08J-393YN	CHIP R
	R21	QRSA08J-223YN	CHIP R
	R22	QRSA08J-471YN	CHIP R
	R23	QRSA08J-222YN	CHIP R
	R24	QRSA08J-681YN	CHIP R
	R25	QRSA08J-681YN	CHIP R
	R26	QRSA08J-471YN	CHIP R
	R27	QRSA08J-561YN	CHIP R
	R28	QRSA08J-681YN	CHIP R
	R29	QRSA08J-153YN	CHIP R
	R30	QRSA08J-223YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R31	QRSA08J-122YN	CHIP R
	R32	QRSA08J-102YN	CHIP R
	R33	QRSA08J-152YN	CHIP R
	R34	PU59237-103	CHIP VR, DELAYED V LEV
	OR	PU59456-103	CHIP VR
	R35	QRSA08J-393YN	CHIP R
	R36	QRSA08J-473YN	CHIP R
	R37	QRSA08J-222YN	CHIP R
	R38	QRSA08J-103YN	CHIP R
	R39	QRSA08J-223YN	CHIP R
	R40	QRSA08J-103YN	CHIP R –
	R41	QRSA08J-122YN	CHIP R
	R42	QRSA08J-681YN	CHIP R
	R43	QRSA08J-681YN	CHIP R
	R44	QRSA08J-391YN	CHIP R
	R45	QRSA08J-562YN	CHIP R
	R46	QRSA08J-473YN	CHIP R
	R47	QRSA08J-473YN	CHIP R
	R48	QRSA08J-333YN	CHIP R
	R49	QRSA08J-333YN	CHIP R
	R50	QRSA08J-122YN	CHIP R
	R51	QRSA08J-471YN	CHIP R
	R52	QRSA08J-152YN	CHIP R
	R53	QRSA08J-333YN	CHIP R
	R54	QRSA08J-333YN	CHIP R
	R55	QRSA08J-122YN	CHIP R
	R56	QRSA08J-272YN	CHIP R
	R57	QRSA08J-222YN	CHIP R
	C1	QCYA1HK-332	CHIP CAP
	C2	QCYA1HK-152	CHIP CAP
	C3	QEF81AM-475	CHIP T CAP
	C4	QEF81AM-105	CHIP T CAP
	C5	QEF81AM-105	CHIP T CAP
	C6	QCYA1HK-102	CHIP CAP
	C7	QCSA1HJ-220	CHIP CAP
	C8	QCYA1HK-103	CHIP CAP
	C9	QCSA1HJ-220	CHIP CAP
	C10	QCYA1HK-103	CHIP CAP
	C11	QCYA1HK-103	CHIP CAP
	C12	QCYA1HK-103	CHIP CAP
	C13	QCYA1EK-223	CHIP CAP
	C14	QEF80JM-476	CHIP T CAP
	C15	QCYA1HK-222	CHIP CAP
	C16	QCYA1HK-103	CHIP CAP
	C17	QCYA1HK-222	CHIP CAP
	C18	QEF81AM-105	CHIP T CAP
	C19	QCYA1EK-223	CHIP CAP
	C20	QCYA1HK-103	CHIP CAP
	C21	QCSA1HJ-151	CHIP CAP
	C22	QEK41AM-107	E CAP
	C23	QCYA1EK-223	CHIP CAP
	C24	QCSA1HJ-220	CHIP CAP
	C25	QER40JM-476	E CAP
	C26	QCSA1HJ-270	CHIP CAP
	C27	QCSA1HJ-330	CHIP CAP
	C28	ECEV1CV100	CHIP E CAP
	C29	QEK41AM-107	E CAP
	C30	QCYA1HK-103	CHIP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C31	QCYA1HK-103	CHIP CAP
	C32	QER40JM-476	E CAP
	C33	QCYA1EK-223	CHIP CAP
	C34	QCYA1HK-103	CHIP CAP
	C35	QCYA1HK-103	CHIP CAP
	C36	QEF81VM-104	CHIP T CAP
	C37	QEF81AM-475	CHIP T CAP
	C38	QCYA1HK-103	CHIP CAP
	C39	QCSA1HJ-390	CHIP CAP
	C40	QCYA1HK-102	CHIP CAP
	C41	ECEV1EV4R7	CHIP E CAP
	C42	QCYA1HK-103	CHIP CAP
	C43	QCSA1HJ-100	CHIP CAP
	C44	QCYA1HK-103	CHIP CAP
	C45	QEF80JM-476	CHIP T CAP
	C46	QEF81AM-105	CHIP T CAP
	C47	QCYA1EK-223	CHIP CAP
	C48	QCYA1EK-223	CHIP CAP
	C49	QEF81AM-105	CHIP T CAP
	C50	QCYA1HK-103	CHIP CAP
	C51	QEF81VM-224	CHIP T CAP
	C52	ECEV1CV100	CHIP E CAP
	C53	QCF11HP-103	C CAP
	L1	PU59482	LC BLOCK
	L3	PU59483	LC BLOCK
	L4	PU58627-100J	CHIP COIL
	OR	PU58201-100J	CHIP COIL
	L5	PU58627-101K	CHIP COIL
	OR	PU58201-101K	CHIP COIL
	L6	PU58627-101K	CHIP COIL
	OR	PU58201-101K	CHIP COIL
	L7	PU58627-390J	CHIP COIL
	OR	PU58201-390J	CHIP COIL
	L8	PU58627-560J	CHIP COIL
	OR	PU58201-560J	CHIP COIL
	L9	PU58627-101K	CHIP COIL
	OR	PU58201-101K	CHIP COIL
	L10	PU58627-101K	CHIP COIL
	OR	PU58201-101K	CHIP COIL
	L11	PU58627-101K	CHIP COIL
	OR	PU58201-101K	CHIP COIL
	TP	PU56278	TEST PIN, TP1 – 11
		PU59780A-C	SUB BOARD ASS'Y (NOT INCLUDED IN PU22428A-02-C OF SKEW JUMP BOARD ASS'Y)
	R10	QVZ3606-222	CHIP VR, INVERTED COL LEV
	L2	PU58627-330J	CHIP COIL
	OR	PU58201-330J	CHIP COIL

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PU22483A-1-C	END ALARM BOARD ASS'Y [13]
	IC1	UPD4040BG	FLAT IC
	IC2	UPD4069UBG	FLAT IC
	IC3	UPD4013BG	FLAT IC
	IC4	UPD4068BG	FLAT IC
	IC5	UPD4027BG	FLAT IC
	IC6	UPD4011BG	FLAT IC
	IC7	BA222	INTEGRATED CIRCUIT
	Q1	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q2	2SA1037K	CHIP TRANSISTOR
	Q3	DTC144EK	CHIP DIGITAL TRANSISTOR
	D1	MA151WA	CHIP DIODE
	R1	QRSA08J-333YN	CHIP R
	R2	QRSA08J-124YN	CHIP R
	R3	QRSA08J-333YN	CHIP R
	R4	QRSA08J-103YN	CHIP R
	R5	QRSA08J-103YN	CHIP R
	R6	QRSA08J-473YN	CHIP R
	R7	QRSA08J-223YN	CHIP R
	R8	QRSA08J-223YN	CHIP R
	R9	QRSA08J-564YN	CHIP R
	R10	QRSA08J-473YN	CHIP R
	C1	QEF81AM-105	CHIP T CAP
	C2	QER41CM-106	E CAP
	C3	QER41CM-106	E CAP
	C4	QCYA1HK-102	CHIP CAP
	C5	QCFA1EZ-104	CHIP CAP
	C6	QCFA1EZ-104	CHIP CAP
	C7	QCFA1EZ-104	CHIP CAP
	SH1	PU59810	SHEET
	SPC1	PQM30029-86	SPACER
	CN1	PU58655-8	CAP. HOUSING

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PU11394E9	IMAGER BOARD ASS'Y [21], [22]
	[IMAGER (1) SECTION]		
	IC1	–	REFER TO [M5]
	IC2	MC-5573A	INTEGRATED CIRCUIT
	IC3	MMH0026CP1	INTEGRATED CIRCUIT
	Q1	2SD601R	CHIP TRANSISTOR
	Q2	2SD601R	CHIP TRANSISTOR
	Q3	2SA1462-T2BY33	CHIP TRANSISTOR
	Q4	2SC3735-T1BB33	CHIP TRANSISTOR
	OR	2SC3735-T1BB34	CHIP TRANSISTOR
	Q5	2SC2778C	CHIP TRANSISTOR
	Q6	2SC2778C	CHIP TRANSISTOR
	Q7	2SC2778C	CHIP TRANSISTOR
	D1	MA153	CHIP DIODE
	D2	MA151K	CHIP DIODE
	D3	MA151K	CHIP DIODE
	R1	QRSA08J-912YN	CHIP R
	R2	QRSA08J-104YN	CHIP R
	R3	QRSA08J-472YN	CHIP R
	R4	QRSA08J-332YN	CHIP R
	R5	PU57457-104	VR
	R6	QRSA08J-104YN	CHIP R
	R7	QRSA08J-224YN	CHIP R
	R8	QRSA08J-332YN	CHIP R
	R9	QRSA08J-101YN	CHIP R
	R10	QRSA08J-220YN	CHIP R
	R11	QRSA08J-124YN	CHIP R
	R12	QRSA08J-303YN	CHIP R
	R13	QRSA08J-222YN	CHIP R
	R14	QRSA08J-220YN	CHIP R
	R15	QRSA08J-393YN	CHIP R
	R16	QRSA08J-153YN	CHIP R
	R17	QRSA08J-272YN	CHIP R
	R18	QRSA08J-102YN	CHIP R
	R19	QRSA08J-102YN	CHIP R
	R20	QRSA08J-123YN	CHIP R
	R21	QRSA08J-333YN	CHIP R
	R22	QRSA08J-102YN	CHIP R
	R23	QRSA08J-333YN	CHIP R
	R24	QRSA08J-183YN	CHIP R
	R25	QRSA08J-102YN	CHIP R
	R26	QRSA08J-681YN	CHIP R
	R27	QRSA08J-220YN	CHIP R
	R28	QRSA08J-220YN	CHIP R
	R47	QRSA08J-104YN	CHIP R
	R48	QRSA08J-101YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C1	QCYA1HK-103	CHIP CAP
	C2	QER41EM-475A	E CAP
	C3	QCYA1HK-103	CHIP CAP
	C4	QEK41CM-107	E CAP
	C5	QCYA1HK-103	CHIP CAP
	C6	ECEV1CV100	CHIP E CAP
	C7	QCYA1HK-103	CHIP CAP
	C8	QER41CM-106A	E CAP
	C9	QCFA1EZ-104	CHIP CAP
	C10	QCYA1HK-103	CHIP CAP
	C11	QCYA1HK-103	CHIP CAP
	C12	QCYA1HK-103	CHIP CAP
	C13	QER41CM-226	E CAP
	C14	QCYA1HK-103	CHIP CAP
	C15	PU58980-105	CHIP CAP
	C16	PU58980-105	CHIP CAP
	C17	QCTA1CH-680	CHIP CAP
	C18	QCTA1CH-680	CHIP CAP
	C19	QEE81AM-476	T CAP
	C20	QCTA1CH-101	CHIP CAP
	C21	QCTA1CH-101	CHIP CAP
	C22	QEF81CM-105	CHIP T CAP
	C23	QCYA1HK-103	CHIP CAP
	C24	QER40JM-476	E CAP
	C25	QCYA1HK-103	CHIP CAP
	C26	QEMA1AM-107	E CAP
	OR	QED40JM-127	E CAP
	C27	QCYA1HK-103	CHIP CAP
	C28	QCYA1HK-103	CHIP CAP
	C29	ECEV1CV100	CHIP E CAP
	C30	QCYA1HK-103	CHIP CAP
	C31	QER41EM-475A	E CAP
	C32	QCYA1HK-103	CHIP CAP
	C33	QER41CM-106A	E CAP
	C34	QCYA1HK-103	CHIP CAP
	C35	QCYA1HK-103	CHIP CAP
	C36	QER41CM-106A	E CAP
	C37	QCYA1HK-103	CHIP CAP
	C38	QCYA1HK-103	CHIP CAP
	C60	QCYA1HK-103	CHIP CAP
	C66	QCYA1HK-103	CHIP CAP
	C67	QCYA1HK-103	CHIP CAP
	C68	QCYA1HK-103	CHIP CAP
	C69	QCYA1HK-103	CHIP CAP
	C70	PU58980-105	CHIP CAP
	C71	PU58980-105	CHIP CAP
	C72	PU58980-105	CHIP CAP
	C78	QCYA1HK-103	CHIP CAP
	C79	–	–
	C80	QCT25CH-390	C CAP
	L1	PU59022-1	CHIP COIL, 100 μH
	L2	PU58385-270K	CHIP COIL

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	L3	PU58385-100K	CHIP COIL
	L4	PU58385-270K	CHIP COIL
	L5	PU58385-100K	CHIP COIL
	FC1	PU58946-1	FLAT CABLE
	FC2	PU58946-2	FLAT CABLE

[IMAGER (2) SECTION]

	IC4	UPD6146G	FLAT IC
	IC5	UPD9311G	FLAT IC
	IC6	–	–
	IC7	MN74HCU04S	FLAT IC
	IC8	SN74ALS00ANS	FLAT IC
	Q8	2SB709R	CHIP TRANSISTOR
	Q9	2SD601R	CHIP TRANSISTOR
	Q10	–	–
	Q11	2SD601R	CHIP TRANSISTOR
	R29	QRSA08J-102YN	CHIP R
	R30	QRSA08J-393YN	CHIP R
	R31	QRSA08J-103YN	CHIP R
	R32	QRSA08J-563YN	CHIP R
	R33	QRSA08J-104YN	CHIP R
	R34	QRSA08J-104YN	CHIP R
	R35	QRSA08J-104YN	CHIP R
	R36	QRSA08J-104YN	CHIP R
	R37	–	–
	R38	–	–
	R39	QRSA08J-271YN	CHIP R
	R40	QRSA08J-271YN	CHIP R
	R41	QVZ3531-331	VR, V. SUB
	R42	–	–
	R43	QRSA08J-0R0Y	CHIP R
	R44	QRSA08J-124YN	CHIP R
	R45	QRSA08J-183YN	CHIP R
	R46	QRSA08J-0R0Y	CHIP R
	R49	QRD161J-271	CR
	R50	QRD161J-271	CR

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C39	QCYA1HK-103	CHIP CAP
	C40	QER41CM-106A	E CAP
	C41	QCYA1HK-103	CHIP CAP
	C42	QER40JM-476	E CAP
	C43	QER40JM-476	E CAP
	C44	QCYA1HK-103	CHIP CAP
	C45	QCYA1HK-103	CHIP CAP
	C46	QER41CM-226	E CAP
	C47	QCYA1HK-103	CHIP CAP
	C48	ECEV1CV100	CHIP E CAP
	C49	–	–
	C50	–	–
	C51	–	–
	C52	QCYA1HK-103	CHIP CAP
	C53	QCTA1CH-220	CHIP CAP
	C54	QCYA1HK-103	CHIP CAP
	C55	QCYA1HK-103	CHIP CAP
	C56	QCTA1CH-470	CHIP CAP
	C57	QCTA1CH-470	CHIP CAP
	C58	–	–
	C59	–	–
	C61	QCYA1HK-103	CHIP CAP
	C62	QER41CM-106A	E CAP
	C63	QCYA1HK-103	CHIP CAP
	C64	QCYA1HK-103	CHIP CAP
	C65	QCYA1HK-103	CHIP CAP
	C73	QCYA1HK-103	CHIP CAP
	C74	QCYA1HK-103	CHIP CAP
	C75	QCYA1HK-103	CHIP CAP
	C76	QCYA1HK-103	CHIP CAP
	L6	PU59022-3	CHIP COIL, 22μH
	L7	PU59022-1	CHIP COIL, 100 μH
	L8	PU58385-100K	CHIP COIL
	L9	PU58385-270K	CHIP COIL
	X1	PU59439	OSCILLATOR
	FW1	PU59131	FLEX. WIRE
	CN-13	PU59100-12	CAP. HOUSING
	SPC1	PQ31341	BOARD SPACER, X 2

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PU22247F-01-C	VIDEO BOARD ASS'Y [23]
	IC1	UPD9310G	FLAT IC
	IC2	UPD74HC74G	FLAT IC
	OR	MN74HCU74S	FLAT IC
	OR	LR74HC74N2	FLAT IC
	IC3	M51277FP	FLAT IC
	IC4	–	–
	IC5	H8D7001	INTEGRATED CIRCUIT
	IC6	HA11881MP	FLAT IC
	IC7	26VT06	INTEGRATED CIRCUIT
	Q1	2SC2778C	CHIP TRANSISTOR
	Q2	2SC2778C	CHIP TRANSISTOR
	Q3	2SC2778C	CHIP TRANSISTOR
	Q4	2SC2778C	CHIP TRANSISTOR
	Q5	2SC2778C	CHIP TRANSISTOR
	Q6	2SC2778C	CHIP TRANSISTOR
	Q7	2SA1022C	CHIP TRANSISTOR
	OR	2SA812	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q8	2SA1022C	CHIP TRANSISTOR
	OR	2SA812	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q9	2SA1022C	CHIP TRANSISTOR
	OR	2SA812	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q10	2SA1022C	CHIP TRANSISTOR
	OR	2SA812	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q11	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q12	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q13	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q14	2SA1022C	CHIP TRANSISTOR
	OR	2SA812	CHIP TRANSISTOR
	Q15	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q16	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q17	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q18	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q19	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q20	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q21	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q22	2SC2778C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q23	–	–
	Q24	FMW2	CHIP PAIR TRANSISTOR
	Q25	2SC2778C	CHIP TRANSISTOR

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	D1	–	–
	D2	1SS99	DIODE
	D3	MA151A	CHIP DIODE
	D4	MA151A	CHIP DIODE
	R1	QRSA08J-332YN	CHIP R
	R2	QRSA08J-332YN	CHIP R
	R3	QRSA08J-152YN	CHIP R
	R4	QRSA08J-152YN	CHIP R
	R5	QRSA08J-104YN	CHIP R
	R6	QRSA08J-682YN	CHIP R
	R7	QRSA08J-222YN	CHIP R
	R8	QRSA08J-333YN	CHIP R
	R9	QRSA08J-223YN	CHIP R
	R10	QRSA08J-102YN	CHIP R
	R11	QRSA08J-102YN	CHIP R
	R12	PU59237-102	CHIP VR, DET CLOCK PHASE
	OR	PU59456-102	CHIP VR
	R13	QRSA08J-332YN	CHIP R
	R14	QRSA08J-103YN	CHIP R
	R15	QRSA08J-333YN	CHIP R
	R16	QRSA08J-103YN	CHIP R
	R17	–	–
	R18	QRSA08J-102YN	CHIP R
	R19	QRSA08J-102YN	CHIP R
	R20	QRSA08J-102YN	CHIP R
	R21	QRSA08J-561YN	CHIP R
	R22	QRSA08J-182YN	CHIP R
	R23	QRSA08J-222YN	CHIP R
	R24	QRSA08J-102YN	CHIP R
	R25	PU59237-102	CHIP VR, YL GAIN
	OR	PU57816-2-102	CHIP VR
	OR	PU59456-102	CHIP VR
	R26	QRSA08J-222YN	CHIP R
	R27	QRSA08J-272YN	CHIP R
	R28	QRSA08J-102YN	CHIP R
	R29	QRSA08J-102YN	CHIP R
	R30	QRSA08J-222YN	CHIP R
	R31	PU59237-103	CHIP VR, R/B BALANCE
	OR	PU57816-2-103	CHIP VR
	OR	QVZ3606-103	CHIP VR
	OR	PU59456-103	CHIP VR
	R32	QRSA08J-332YN	CHIP R
	R33	QRSA08J-122YN	CHIP R
	R34	QRSA08J-103YN	CHIP R
	R35	QRSA08J-103YN	CHIP R
	R36	QRSA08J-102YN	CHIP R
	R37	QRSA08J-102YN	CHIP R
	R38	PU59237-103	CHIP VR, B CARR BAL
	OR	PU59456-103	CHIP VR
	R39	PU59237-103	CHIP VR, R CARR BAL
	OR	PU59456-103	CHIP VR
	R40	PU59237-102	CHIP VR, COL DIFF BAL
	OR	PU57816-2-102	CHIP VR
	OR	PU59456-102	CHIP VR
	R41	QRSA08J-222YN	CHIP R
	R42	PU59237-472	CHIP VR, NOISE SUP
	OR	PU57816-2-472	CHIP VR
	OR	PU59456-472	CHIP VR

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R43	QRSA08J-332YN	CHIP R
	R44	QRSA08J-273YN	CHIP R
	R45	QRSA08J-223YN	CHIP R
	R46	QRSA08J-272YN	CHIP R
	R47	QRSA08J-332YN	CHIP R
	R48	QRSA08J-222YN	CHIP R
	R49	QRSA08J-472YN	CHIP R
	R50	PU59237-222	CHIP VR, YH GAIN
	OR	PU59456-222	CHIP VR
	R51	QRSA08J-222YN	CHIP R
	R52	QRSA08J-273YN	CHIP R
	R53	QRSA08J-223YN	CHIP R
	R54	–	–
	R55	QRSA08J-392YN	CHIP R
	R56	QRSA08J-152YN	CHIP R
	R57	PU59237-222	CHIP VR, B-Y GAIN
	OR	PU59456-222	CHIP VR
	R58	QRSA08J-102YN	CHIP R
	R59	QRSA08J-272YN	CHIP R
	R60	PU59237-222	CHIP VR, R SET UP
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R61	QRSA08J-152YN	CHIP R
	R62	PU59237-222	CHIP VR, B SET UP
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R63	PU59237-222	CHIP VR, YL SET UP
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R64	PU59237-222	CHIP VR, YH SET UP
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R65	PU59237-222	CHIP VR, V EDGE BALANCE
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R66	QRSA08J-272YN	CHIP R
	R67	QRSA08J-272YN	CHIP R
	R68	QRSA08J-332YN	CHIP R
	R69	QRSA08J-103YN	CHIP R
	R70	QRSA08J-223YN	CHIP R
	R71	QRSA08J-821YN	CHIP R
	R72	QRSA08J-222YN	CHIP R
	R73	QRSA08J-132YN	CHIP R
	R74	QRSA08J-331YN	CHIP R
	R75	QRSA08J-391YN	CHIP R
	R76	QRSA08J-911YN	CHIP R
	R77	QRSA08J-103YN	CHIP R
	R78	QRSA08J-391YN	CHIP R
	R79	QRSA08J-331YN	CHIP R
	R80	QRSA08J-561YN	CHIP R
	R81	–	–
	R82	QRSA08J-393YN	CHIP R
	R83	QRSA08J-103YN	CHIP R
	R84	–	–
	R85	–	–
	R86	–	–
	R87	–	–
	R88	–	–
	R89	–	–
	R90	QRSA08J-562YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R91	QRSA08J-562YN	CHIP R
	R92	–	–
	R93	–	–
	R94	–	–
	R95	–	–
	R96	–	–
	R97	–	–
	R98	–	–
	R99	–	–
	R100	QRSA08J-0R0Y	CHIP R
	R101	–	–
	R102	–	–
	R103	–	–
	R104	–	–
	R105	–	–
	R106	–	–
	R107	–	–
	R108	–	–
	R109	–	–
	R110	–	–
	R111	–	–
	R112	–	–
	R113	–	–
	R114	–	–
	R115	–	–
	R116	–	–
	R117	–	–
	R118	–	–
	R119	–	–
	R120	QRSA08J-223YN	CHIP R
	R121	QRSA08J-103YN	CHIP R
	R122	PU59237-473	CHIP VR, AGC
	OR	PU59456-473	CHIP VR
	R123	QRSA08J-103YN	CHIP R
	R124	–	–
	R125	–	–
	R126	–	–
	R127	–	–
	R128	QRSA08J-473YN	CHIP R
	R129	QRSA08J-822YN	CHIP R
	R130	PU59237-472	CHIP VR, R LIMITER
	R131	QRSA08J-103YN	CHIP R
	R132	QRSA08J-152YN	CHIP R
	R133	QRSA08J-224YN	CHIP R
	R134	QRSA08J-103YN	CHIP R
	R135	QRSA08J-103YN	CHIP R
	R136	QRSA08J-272YN	CHIP R
	R137	QRSA08J-152YN	CHIP R
	R138	QRSA08J-332YN	CHIP R
	R142	QRSA08J-0R0Y	CHIP R
	R143	QRSA08J-103YN	CHIP R
	R144	QRSA08J-102YN	CHIP R
	R145	QRSA08J-154YN	CHIP R
	R146	PU59237-103	CHIP VR, B L.S CARRY BAL
	R147	QRSA08J-103YN	CHIP R
	R148	PU59237-103	CHIP VR, R L.S CARRY BAL
	R149	QRSA08J-103YN	CHIP R
	R150	QRSA08J-103YN	CHIP R
	R151	QRSA08J-822YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R152	QRSA08J-102YN	CHIP R
	R153	QRD161J-102	CR
	R154	QRD161J-332	CR
	R155	QRD161J-394	CR
	R156	–	–
	R157	QRD161J-224	CR
	C1	QCFA1EZ-104	CHIP CAP
	C2	–	–
	C3	QCSA1HJ-390	CHIP CAP
	C4	QCSA1HJ-390	CHIP CAP
	C5	QCYA1HK-103	CHIP CAP
	C6	QCYA1HK-102	CHIP CAP
	C7	QCYA1HK-103	CHIP CAP
	C8	QCSA1HJ-150	CHIP CAP
	C9	QCYA1HK-103	CHIP CAP
	C10	QCSA1HJ-220	CHIP CAP
	C11	QCYA1HK-103	CHIP CAP
	C12	QCYA1HK-103	CHIP CAP
	C13	QCYA1HK-103	CHIP CAP
	C14	ECEV1CV100	CHIP E CAP
	C15	QER40JM-226	E CAP
	C16	QER40GM-336	E CAP
	C17	QER40JM-106A	E CAP
	C18	QER41EM-225A	E CAP
	C19	QER40JM-226	E CAP
	C20	QER40JM-226	E CAP
	C21	QCYA1HK-103	CHIP CAP
	C22	–	–
	C23	QCTA1CH-330	CHIP CAP
	C24	ECEV1CV100	CHIP E CAP
	C25	ECEV1CV100	CHIP E CAP
	C26	ECEV1HVR47	CHIP E CAP
	C27	ECEV1CV100	CHIP E CAP
	C28	ECEV1CV100	CHIP E CAP
	C29	ECEV0JN100	CHIP NP CAP
	C30	QCFA1EZ-104	CHIP CAP
	C31	ECEV1CV100	CHIP E CAP
	C32	QCFA1EZ-104	CHIP CAP
	C33	PU58980-105	CHIP CAP
	C34	ECEV0GV330	CHIP E CAP
	C35	QCYA1HK-103	CHIP CAP
	C36	PU58980-105	CHIP CAP
	C37	PU58980-105	CHIP CAP
	C38	QEF80GM-475	CHIP T CAP
	C39	QEF80GM-475	CHIP T CAP
	C40	ECEV0JV220	CHIP E CAP
	C41	ECEV0JV220	CHIP E CAP
	C42	–	–
	C43	QCYA1HK-103	CHIP CAP
	C44	QER40JM-226	E CAP
	C45	QCYA1HK-103	CHIP CAP
	C46	QCYA1HK-103	CHIP CAP
	C47	QCYA1HK-103	CHIP CAP
	C48	QCYA1HK-103	CHIP CAP
	C49	QCYA1HK-103	CHIP CAP
	C50	QCFA1EZ-104	CHIP CAP
	C51	QCY81EK-473	CHIP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C52	ECEV0JV220	CHIP E CAP
	C53	ECEV0JV220	CHIP E CAP
	C54	QCY81EK-473	CHIP CAP
	C55	QCFA1EZ-104	CHIP CAP
	C56	QCY81EK-473	CHIP CAP
	C57	ECEV0JV220	CHIP E CAP
	C58	ECEV0JV220	CHIP E CAP
	C59	QCFA1EZ-104	CHIP CAP
	C60	QCYA1HK-103	CHIP CAP
	C61	QCSA1HJ-470	CHIP CAP
	C62	ECEV0GV330	CHIP E CAP
	C63	QCSA1HJ-330	CHIP CAP
	C64	QCSA1HJ-330	CHIP CAP
	C65	QCSA1HJ-330	CHIP CAP
	C66	QCSA1HJ-330	CHIP CAP
	C67	QCSA1HJ-330	CHIP CAP
	C68	QER40JM-226	E CAP
	C69	QCYA1HK-103	CHIP CAP
	C70	QCYA1HK-103	CHIP CAP
	C71	QRSA08J-0R0Y	CHIP R
	C72	QCTA1CH-390	CHIP CAP
	C73	ECEV0JV220	CHIP E CAP
	C74	–	–
	C75	QCSA1HK-220	CHIP CAP
	C100	QCF11HP-103	C CAP
	C120	QEE41CM-226	T CAP
	C121	–	–
	C122	QCYA1EK-223	CHIP CAP
	C123	ECEV0JV101	CHIP E CAP
	C124	ECEV1CV100	CHIP E CAP
	C125	QCTA1CH-330	CHIP CAP
	C126	QEE41CM-106	T CAP
	C127	QCYA1HK-103	CHIP CAP
	L1	PU58627-120K	CHIP COIL
	OR	PU58201-120K	CHIP COIL
	L2	PU58627-120K	CHIP COIL
	OR	PU58201-120K	CHIP COIL
	L3	PU58627-120K	CHIP COIL
	OR	PU58201-120K	CHIP COIL
	L4	PU59022-3	CHIP COIL, 22 μH
	L5	PU58385-4R7K	CHIP COIL
	L6	PU58627-120K	CHIP COIL
	OR	PU58201-120K	CHIP COIL
	L7	PU58627-120K	CHIP COIL
	OR	PU58201-120K	CHIP COIL
	L8	PU59115	FERRITE BEADS
	L9	PU59115	FERRITE BEADS
	L10	PU59115	FERRITE BEADS
	L11	PU59115	FERRITE BEADS
	L12	PU59115	FERRITE BEADS
	X101	PU59432	VCXO

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	BPF1	PU59442	CHIP BAND PASS FILTER
	LPF1	PU59435	CHIP LOW PASS FILTER
	LPF2	PU59434	CHIP LOW PASS FILTER
	LPF3	PU59433	CHIP LOW PASS FILTER
	EQ1	PU59436	CHIP EQUALIZER
	TRAP1	PU59437	CHIP CERAMIC TRAP
	DL1	PU59021	CHIP DELAY LINE
	SLD1	PQ42497-1-1	SHIELD CASE
	SLD2	PQ42687	SHIELD PLATE
	SLD3	PQ42548-2-1	PLATE
	TP	PU59111-2	TEST PIN, TP1–17
	CN-V1	PU59114	CAP. HOUSING
	CN-V2	PU58654-4	CAP. HOUSING
	CN-V3	PU58655-2	CAP. HOUSING
	CN-V4	PU58252-10	CAP. HOUSING
	CN-V5	PU58252-4	CAP. HOUSING
	CN-V6	PU58252-10	CAP. HOUSING
		PU22248E-1-C	EE & IND BOARD ASS'Y [24]
	IC1	MN1239JVQ	FLAT IC
	IC2	HA11776AMP	FLAT IC
	IC3	UPC324G2	FLAT IC
	OR	IR3702N2	FLAT IC
	IC4	BA6208F	FLAT IC
	IC5	MN74HCU04S	FLAT IC
	OR	UPD74HC04G2	FLAT IC
	OR	LR74HC04N2	FLAT IC
⚠	IC6	AN8005	INTEGRATED CIRCUIT

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	Q1	2SC2412KT-97R	CHIP TRANSISTOR
	OR	2SD601R	CHIP TRANSISTOR
	Q2	–	–
	Q3	2SK198	CHIP FET
	Q4	2SC2778B,C	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q5	DTC144WK	CHIP DIGITAL TRANSISTOR
	Q6	2SK621	CHIP DIGITAL FET
	Q7	2SC2778B,C	CHIP TRANSISTOR
	OR	2SC2413KT-96P,Q	CHIP TRANSISTOR
	Q8	2SC2413KT-97P,Q	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q9	2SC2412KT-97R	CHIP TRANSISTOR
	OR	2SC1623	CHIP TRANSISTOR
	Q10	2SC2778B,C	CHIP TRANSISTOR
	OR	2SC2412KT-97R	CHIP TRANSISTOR
	Q11	2SK198P,Q	CHIP FET
	Q12	2SA1037KT-96R	CHIP TRANSISTOR
	OR	2SB709Q,R	CHIP TRANSISTOR
	Q13	2SC2778B,C	CHIP TRANSISTOR
	OR	2SC2412KT-96R	CHIP TRANSISTOR
	D1	MA151WA	CHIP DIODE
	D2	–	–
	D3	MA151A	CHIP DIODE
	OR	MA151WA	CHIP DIODE
	OR	DAP202K	CHIP DIODE
	D4	MA151WA	CHIP DIODE
	OR	DAP202K	CHIP DIODE
	D5	MA151WA	CHIP DIODE
	OR	DAP202K	CHIP DIODE
	D6	–	–
	D7	RD8.2ESB2	ZENER DIODE
	D8	RD8.2ESB2	ZENER DIODE
	D9	RD8.2ESB2	ZENER DIODE
	D10	DAN202K	DIODE
	D11	MA151K	CHIP DIODE
	D12	MA151K	CHIP DIODE
	D13	DAN202K	CHIP DIODE
	D14	1SS133	DIODE
	D15	MA151K	CHIP DIODE
	D16	MA151K	CHIP DIODE
	R1	QVZ3606-222	CHIP VR, IND H WIDTH
	R2	QRSA08J-182YN	CHIP R
	R3	QRSA08J-223YN	CHIP R
	R4	QRSA08J-223YN	CHIP R
	R5	–	–
	R6	QRSA08J-104YN	CHIP R
	R7	–	–
	R8	QVZ3606-103	CHIP VR, WHITE CLIP
	R9	–	–
	R10	QRSA08J-682YN	CHIP R
	R11	QRSA08J-103YN	CHIP R
	R12	QRSA08J-332YN	CHIP R
	R13	QRSA08J-562YN	CHIP R
	R14	QRSA08J-561YN	CHIP R
	R15	QRSA08J-562YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R16	QRSA08J-223YN	CHIP R
	R17	QRSA08J-222YN	CHIP R
	R18	QRSA08J-100YN	CHIP R
	R19	QRSA08J-103YN	CHIP R
	R20	QRSA08J-682YN	CHIP R
	R21	QRSA08J-103YN	CHIP R
	R22	QRSA08J-102YN	CHIP R
	R23	QRSA08J-222YN	CHIP R
	R24	QRSA08J-561YN	CHIP R
	R25	QRSA08J-563YN	CHIP R
	R26	QRSA08J-103YN	CHIP R
	R27	QRSA08J-393YN	CHIP R
	R28	QRSA08J-222YN	CHIP R
	R29	QRSA08J-122YN	CHIP R
	R30	QRSA08J-103YN	CHIP R
	R31	QRSA08J-473YN	CHIP R
	R32	QRSA08J-822YN	CHIP R
	R33	QRSA08J-333YN	CHIP R
	R34	QRSA08J-223YN	CHIP R
	R35	QRSA08J-222YN	CHIP R
	R36	QRSA08J-150YN	CHIP R
	R37	QRSA08J-122YN	CHIP R
	R38	–	–
	R39	QVZ3606-102	CHIP VR, CHROMA GAIN
	R40	QRSA08J-122YN	CHIP R
	R41	QRSA08J-153YN	CHIP R
	R42	QRSA08J-223YN	CHIP R
	R43	QRSA08J-123YN	CHIP R
	R44	QRSA08J-123YN	CHIP R
	R45	QRSA08J-471YN	CHIP R
	R46	QVZ3606-103	CHIP VR, BURST PHASE
	R47	QRSA08J-104YN	CHIP R
	R48	QRSA08J-104YN	CHIP R
	R49	QVZ3606-102	CHIP VR, S.C PHASE
	R50	QVZ3606-472	CHIP VR, BURST GAIN
	R51	QRSA08J-103YN	CHIP R
	R52	QRSA08J-103YN	CHIP R
	R53	QRSA08J-104YN	CHIP R
	R54	QRSA08J-103YN	CHIP R
	R55	QRSA08J-103YN	CHIP R
	R56	QRD161J-101	CR
	R57	QRSA08J-152YN	CHIP R
	R58	QRSA08J-103YN	CHIP R
	R59	QRSA08J-182YN	CHIP R
	R60	QRSA08J-222YN	CHIP R
	R61	QVZ3606-102	CHIP VR, IRIS
	R62	QRSA08J-272YN	CHIP R
	R63	QRSA08J-104YN	CHIP R
	R64	QRSA08J-103YN	CHIP R
	R65	QRSA08J-103YN	CHIP R
	R66	–	–
	R67	–	–
	R68	QRSA08J-822YN	CHIP R
	R69	QRSA08J-103YN	CHIP R
	R70	QRSA08J-183YN	CHIP R
	R71	QRSA08J-223YN	CHIP R
	R72	QRSA08J-223YN	CHIP R
	R73	QRSA08J-223YN	CHIP R
	R74	QRSA08J-0R0Y	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R75	QRSA08J-100YN	CHIP R
	R76	QRSA08J-272YN	CHIP R
	R77	QRSA08J-223YN	CHIP R
	R78	QRSA08J-223YN	CHIP R
	R79	QRSA08J-102YN	CHIP R
	R80	QRSA08J-562YN	CHIP R
	R81	QRSA08J-333YN	CHIP R
	R82	QRSA08J-183YN	CHIP R
	R83	QRSA08J-103YN	CHIP R
	R84	QRSA08J-272YN	CHIP R
	R85	QRSA08J-103YN	CHIP R
	R86	QRSA08J-684YN	CHIP R
	R87	QRSA08J-102YN	CHIP R
	R88	QRSA08J-102YN	CHIP R
	R89	QRSA08J-103YN	CHIP R
	R90	QRSA08J-183YN	CHIP R
	R91	QRSA08J-103YN	CHIP R
	R92	QRSA08J-362YN	CHIP R
	R93	QRSA08J-153YN	CHIP R
	R94	QRSA08J-103YN	CHIP R
	R95	QRD161J-223	CR
	R96	–	–
	R97	QRSA08J-333YN	CHIP R
	R98	QRSA08J-333YN	CHIP R
	R99	QRSA08J-102YN	CHIP R
	R100	–	–
	R101	QRSA08J-0R0Y	CHIP R
	R102	QRSA08J-105YN	CHIP R
	R103	QRSA08J-104YN	CHIP R
	R104	QRSA08J-223YN	CHIP R
	R105	QRSA08J-123YN	CHIP R
	C1	–	–
	C2	QER41AM-476	E CAP
	C3	–	–
	C4	–	–
	C5	–	–
	C6	QER41CM-106A	E CAP
	C7	QER40JM-226	E CAP
	C8	QCYA1HK-103	CHIP CAP
	C9	–	–
	C10	–	–
	C11	PU58980-105	CHIP CAP
	C12	QCYA1HK-103	CHIP CAP
	C13	QER41CM-106A	E CAP
	C14	QCYA1HK-103	CHIP CAP
	C15	–	–
	C16	QER41CM-106A	E CAP
	C17	QCYA1HK-103	CHIP CAP
	C18	QCYA1HK-103	CHIP CAP
	C19	QCYA1HK-103	CHIP CAP
	C20	QEE81AM-476	T CAP
	C21	QCYA1HK-103	CHIP CAP
	C22	–	–
	C23	QCFA1EZ-104	CHIP CAP
	C24	QER41CM-106A	E CAP
	C25	QER40JM-476	E CAP
	C26	QCYA1HK-103	CHIP CAP
	C27	QCYA1HK-103	CHIP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C28	QCFA1EZ-104	CHIP CAP
	C29	QCSA1HJ-391	CHIP CAP
	C30	QER40GM-336	E CAP
	C31	QCYA1HK-103	CHIP CAP
	C32	QCTA1CH-560	CHIP CAP
	C33	QCYA1HK-103	CHIP CAP
	C34	QCYA1HK-103	CHIP CAP
	C35	QCFA1EZ-104	CHIP CAP
	C36	QCYA1HK-103	CHIP CAP
	C37	QCYA1HK-103	CHIP CAP
	C38	QCFA1EZ-104	CHIP CAP
	C39	QCYA1HK-102	CHIP CAP
	C40	QCYA1HK-103	CHIP CAP
	C41	QCFA1EZ-104	CHIP CAP
	C42	QCFA1EZ-104	CHIP CAP
	C43	QCYA1HK-103	CHIP CAP
	C44	QCSA1HJ-180	CHIP CAP
	C45	QCFA1EZ-104	CHIP CAP
	C46	QCFA1EZ-104	CHIP CAP
	C47	QER40JM-226	E CAP
	C48	QER40GM-336	E CAP
	C49	–	–
	C50	–	–
	C51	QCY81EK-473	CHIP CAP
	C52	–	–
	C53	QER41CM-106A	E CAP
	C54	QER41CM-106A	E CAP
	C55	QCSA1HJ-221	CHIP CAP
	C61	QCFA1EZ-104	CHIP CAP
	C62	QCFA1EZ-104	CHIP CAP
	C63	QCFA1EZ-104	CHIP CAP
	C64	QCFA1EZ-104	CHIP CAP
	L1	–	–
	L2	–	–
	L3	–	–
	L4	PU59022-1	CHIP COIL, 100 μH
	L5	PU58627-220K	CHIP COIL
	OR	PU58201-220K	CHIP COIL
	L6	PU58201-220K	CHIP COIL
	OR	PU58627-220K	CHIP COIL
	BPF1	PU59438	CHIP BAND PASS FILTER
	SLD1	PQ42548	PLATE
	TP	PU59111-2	TEST PIN, TP1–5
	CN-E1	–	–
	CN-E2	PU58250-4	CAP. HOUSING

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	CN-E3	PU58250-10	CAP. HOUSING
	CN-E4	PU58250-10	CAP. HOUSING
	CN-E5	PU58654-7	CAP. HOUSING
	CN-E6	PU58654-6	CAP. HOUSING
	CN-E7	–	–
	CN-E8	–	–
	CN-E9	–	–
	CN-E10	PU58654-4	CAP. HOUSING
	CN-E11	PU58654-2	CAP. HOUSING
	CN-E12	PU58654-3	CAP. HOUSING
	CN-E13	PU58654-3	CAP. HOUSING
	CN-E14	PU58252-8	CAP. HOUSING
	CN-E15	PU58654-2	CAP. HOUSING
		PU36017E-02-C	CONTROL BOARD ASS'Y [26]
	IC701	IR3P50M	FLAT IC
	Q701	2SD601Q	CHIP TRANSISTOR
	Q702	2SD601Q	CHIP TRANSISTOR
	D701	MA704	CHIP ZENER DIODE
	D702	MA704	CHIP ZENER DIODE
	D703	RD8.2ESB2	ZENER DIODE
	D704	RD8.2ESB2	ZENER DIODE
	PD1	PD152V	PHOTO DIODE
	R701	–	–
	R702	–	–
	R703	ERT-D2FIK-154S	THERMISTOR
	R704	QRSA08J-392YN	CHIP R
	R705	QVZ3606-223	CHIP VR, COLOR SENSOR
	R706	QRSA08J-822YN	CHIP R
	R707	QRSA08J-472YN	CHIP R
	R708	QRSA08J-473YN	CHIP R
	R709	QRSA08J-123YN	CHIP R
	R710	QRSA08J-683YN	CHIP R
	R711	–	–
	R712	QRSA08J-104YN	CHIP R
	R713	QRSA08J-822YN	CHIP R
	R714	QRSA08J-333YN	CHIP R
	R715	QRSA08J-333YN	CHIP R

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R716	QRSA08J-103YN	CHIP R
	R717	QRSA08J-0R0Y	CHIP R
	R718	QVZ3606-222	CHIP VR, R GAIN (INDOOR)
	R719	QRSA08J-0R0Y	CHIP R
	R720	QRSA08J-223YN	CHIP R
	R721	QVZ3606-473	CHIP VR, R GAIN (OUTDOOR)
	R722	QRSA08J-273YN	CHIP R
	R723	QRSA08J-123YN	CHIP R
	R724	QRSA08J-564YN	CHIP R
	R725	QRSA08J-203YN	CHIP R
	R726	QRSA08J-103YN	CHIP R
	R727	–	–
	R728	QRSA08J-183YN	CHIP R
	R729	QRSA08J-223YN	CHIP R
	R730	QVZ3606-473	CHIP VR, B GAIN (OUTDOOR)
	R731	QRSA08J-223YN	CHIP R
	R732	QRSA08J-0R0Y	CHIP R
	R733	QVZ3606-222	CHIP VR, B GAIN (INDOOR)
	R734	QRSA08J-0R0Y	CHIP R
	R735	QRSA08J-393YN	CHIP R
	R736	QRSA08J-0R0Y	CHIP R
	R737	QRSA08J-433YN	CHIP R
	R738	QRSA08J-822YN	CHIP R
	R739	QRSA08J-333YN	CHIP R
	R740	QRSA08J-123YN	CHIP R
	R741	QRSA08J-513YN	CHIP R
	R742	QRSA08J-113YN	CHIP R
	R743	QRSA08J-562YN	CHIP R
	R744	QRSA08J-564YN	CHIP R
	R745	QRSA08J-102YN	CHIP R
	R746	QRSA08J-223YN	CHIP R
	R747	QRSA08J-223YN	CHIP R
	R748	QRSA08J-122YN	CHIP R
	R749	QRSA08J-222YN	CHIP R
	R750	QRSA08J-152YN	CHIP R
	R751	QRSA08J-101YN	CHIP R
	R752	QRSA08J-122YN	CHIP R
	R753	QVZ3606-223	CHIP VR, OUTDOOR PRESET
	R754	QVZ3606-472	CHIP VR, INDOOR PRESET
	B701	QRSA08J-0R0Y	CHIP R
	B702	QRSA08J-0R0Y	CHIP R
	B703	–	–
	B704	QRSA08J-0R0Y	CHIP R
	B705	QRSA08J-0R0Y	CHIP R
	B706	–	–
	B707	QRSA08J-0R0Y	CHIP R
	C701	QER41CM-226	E CAP
	C702	QCFA1HZ-103	CHIP CAP
	C703	QCFA1EZ-104	CHIP CAP
	C704	QCYA1HK-103	CHIP CAP
	C705	QEE41AM-685	T CAP
	C706	QCFA1EZ-104	CHIP CAP
	C707	QCYA1HK-682	CHIP CAP
	C708	QER41AM-336	E CAP
	C709	PU58980-105	CHIP CAP
	C710	QCFA1HZ-152	CHIP CAP

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C711	QCFA1HZ-152	CHIP CAP
	C712	QER41CM-106A	E CAP
	C713	QER40GM-476	E CAP
	C714	QCFA1HZ-103	CHIP CAP
	C715	QER41CM-226	E CAP
	C716	QER41CM-106A	E CAP
	C717	QCFA1HZ-103	CHIP CAP
	C718	QER41AM-336	E CAP
	C719	QER41AM-476	E CAP
	L701	PU58385-4R7K	CHIP COIL
	S701	PU57008	TACT SWITCH, FADER
	S702	PU57008	TACT SWITCH, BLC
	S703	PU57008	TACT SWITCH, FULL AUTO SET
	S704	PU57008	TACT SWITCH, PRESET
	S705	PU57008	TACT SWITCH, FOCUS AUTO/MANUAL
	TP	PU58465	TEST PIN, TP701
	CN-C1	PU58654-15	CAP. HOUSING
	CN-C2	–	–
	CN-C3	PU58654-3	CAP. HOUSING
	SLD1	PQ42547-1-1	W/B SHIELD CASE
	SLD2	PU59059	CASE
	SLD3	PQ42617-1-1	W/B SHIELD PLATE
	SLD4	PQ42548-3	PLATE
		PQ42493	IR CUT FILTER
	HD1	PQ42421	FILTER HOLDER
		PU1139483	TRIGGER BOARD ASS'Y [27]
	SW1	PU59007	PUSH SWITCH, TRIGGER

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PU36016E-C	REGULATOR BOARD ASS'Y [28]
	IC1	M5236ML	FLAT IC
⚠	IC2	AN79L08	INTEGRATED CIRCUIT
	Q1	2SB793R	TRANSISTOR
	R1	QRSA08J-221YN	CHIP R
	R2	QRSA08J-822YN	CHIP R
	R3	–	–
	R4	–	–
	R5	–	–
	R6	QVZ3531-222	VR, 8 V ADJ
	R7	QRSA08J-123YN	CHIP R
⚠	R8	PU52108-101	POSISTOR
	C1	QED41EM-396	E CAP
	C2	QCYA1HK-103	CHIP CAP
	C3	QCYA1HK-103	CHIP CAP
	C4	QED41EM-396	E CAP
	C5	QED41EM-396	E CAP
	C6	QCYA1HK-103	CHIP CAP
	C7	QCYA1HK-103	CHIP CAP
	C8	QED41EM-396	E CAP
	C9	QED41AM-826	E CAP
	C10	QCYA1HK-103	CHIP CAP
	C11	QCYA1HK-103	CHIP CAP
	C12	QED41AM-826	E CAP
	C13	QED41CM-566	E CAP
	C14	QCYA1HK-103	CHIP CAP
	C15	QCYA1HK-103	CHIP CAP
	C16	QED41AM-826	E CAP
	C17	QED41CM-566	E CAP
	C18	QCFA1EZ-104	CHIP CAP
	C19	QCY81EK-473	CHIP CAP
	C20	QED41AM-826	E CAP
	C21	QCYA1HK-103	CHIP CAP
	C22	QED40JM-127	E CAP
	C23	QCYA1HK-103	CHIP CAP
	L1	PU59025	B.F.C.C. COIL, 100 μH
	L2	PU59025	B.F.C.C. COIL, 100 μH
	L3	PU59025	B.F.C.C. COIL, 100 μH
	L4	–	–
	L5	PU58385-4R7K	CHIP COIL
⚠	DD CON1	PU59116-2	DC-DC CONVERTER
⚠	OR	PU59221	DC-DC CONVERTER

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	TP	PU59111-2	TEST PIN, TP1
	CN-R1	PU58654-6	CAP. HOUSING
	CN-R2	PU58655-6	CAP. HOUSING
	CN-R3	PU58250-8	CAP. HOUSING
		PU59192C-C	PAL SUB BOARD ASS'Y [29]
	Q1024	FMS2	CHIP PAIR TRANSISTOR
	R1128	QRSA08J-473YN	CHIP R
	R1129	QRSA08J-102YN	CHIP R
	R1130	PU57457-682	VR, YELLOW SUP
	R1131	QRSA08J-123YN	CHIP R
	R1132	QRD161J-221	CR
	C1127	QCYA1HK-103	CHIP CAP
	CN-P1	PU58655-6	CAP. HOUSING
		PQ42533	BOARD PLATE
	SCR1	SDSP2003Z	SCREW

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PU59336B1	ELECTRONIC VIEWFINDER (1) BOARD ASS'Y [30]
⚠	IC1	AN2510S	INTEGRATED CIRCUIT
⚠	IC2	AN78L05	INTEGRATED CIRCUIT
⚠	OR	TA78L005AP	INTEGRATED CIRCUIT
	TR2	2SC2812	CHIP TRANSISTOR
	OR	2SC2712GL	CHIP TRANSISTOR
	D41	DAP202K	CHIP DIODE
	OR	DSA010	CHIP DIODE
	OR	MA152A	CHIP DIODE
	R21	QRSA08J-471YN	CHIP R
	R22	QRSA08J-561YN	CHIP R
	R23	QRSA08J-471YN	CHIP R
	R24	QRSA08J-682YN	CHIP R
	R25	QRSA08K-3R9YN	CHIP R
	R26	QRSA08J-151YN	CHIP R
	R27	QRSA08J-102YN	CHIP R
	R28	QRSA08J-202YN	CHIP R
	R29	QRSA08J-332YN	CHIP R
	R30	QRSA08J-180YN	CHIP R
	R31	QRSA08J-122YN	CHIP R
⚠	R32	QRSA08J-683YN	CHIP R
	R33	QRSA08J-222YN	CHIP R
	R34	QRSA08J-562YN	CHIP R
	R41	QRSA08J-153YN	CHIP R
	R42	QRSA08J-202YN	CHIP R
	R43	QRSA08J-822YN	CHIP R
	R44	QRSA08J-183YN	CHIP R
	R45	QRSA08J-202YN	CHIP R
	R46	QRSA08J-334YN	CHIP R
	R47	QRSA08J-472YN	CHIP R
	VR1	PU59090-54	VR, 2 kΩ
	VR2	PU59090-55	VR, 1 MΩ
	VR3	PU59090-56	VR, 200 Ω
	VR4	PU59090-57	VR, 5 kΩ
	C11	QEK41AM-107	E CAP
	C21	QER41EM-475	E CAP
	C22	QCYA1HK-561	CHIP CAP
	OR	QCYA1HK-681	CHIP CAP
	C23	QEE41VM684	T CAP
	C24	QEK41AM-336	E CAP
	C25	QEK41AM-336	E CAP
	C26	QEK60JM-227	E CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C31	QCFA1HZ-223	CHIP CAP
	C32	QER41CM-106	E CAP
	C33	QCTA1UJ-152	CHIP CAP
	C41	QEK41HM-225	E CAP
	C42	QEK41CM-106	E CAP
	C43	QEK41CM-106	E CAP
	C44	QCTA1CH-161	CHIP CAP
	C45	QCFA1HZ-333	CHIP CAP
	C46	QEK41CM-106	E CAP
	L11	PU59090-58	COIL, 47 μH
⚠	CP	ICP-N10	CIRCUIT PROTECTOR
⚠	TH	PU59340	THERMISTOR
		PU59336B2	ELECTRONIC VIEWFINDER (2) BOARD ASS'Y [31]
⚠	TR1	2SD774	TRANSISTOR
	OR	2SD763	TRANSISTOR
	D51	1SS136	DIODE
⚠	D52	1SS133	DIODE
	D53	ERA15-06	DIODE
⚠	D54	ERA15-06	DIODE
	R51	QRD163J-750	CR
	R52	QRD163J-102	CR
	R53	QRD183J-625	CR
	RX1	QRD163J-3R3	CR
	RX2	QRD163J-0R0	CR
	C51	QEK41HM-105	E CAP
	C52	QETA1HM-226	E CAP
	C53	QET1AM-107	E CAP
	C54	QETA1CM-476	E CAP
⚠	C55	QFG42AJ-222	PP CAP
⚠	OR	QFG42AJ-332	PP CAP

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	C56	PU59090-51	FM CAP, 1500 P/400
⚠	CN2	PU59090-52	CRT SOCKET
⚠	TF	PU59090-42	THERMAL FUSE
⚠	FBT	PU59090-27	FLYBACK TRANS SET, INCL. RX1, RX2, C55
	RX1	QRD161J-0R0	CR
	OR	QRD161J-3R3	CR
	OR	QRD161J-7R2	CR
	RX2	QRD161J-0R0	CR
	OR	QRD161J-684	CR
	C55	PU59090-47	PP CAP, 680 P/100
	OR	PU59090-48	PP CAP, 1000 P/100
	OR	PU59090-49	PP CAP, 1500 P/100
	OR	PU59090-50	PP CAP, 2000 P/100
	HLC	PU59090-28	HLC SET, INCL. RX1, RX2, C55
	RX1	QRD161J-0R0	CR
	OR	QRD161J-3R3	CR
	OR	QRD161J-7R2	CR
	RX2	QRD161J-0R0	CR
	OR	QRD161J-684	CR
	C55	PU59090-47	PP CAP, 680 P/100
	OR	PU59090-48	PP CAP, 1000 P/100
	OR	PU59090-49	PP CAP, 1500 P/100
	OR	PU59090-50	PP CAP, 2000 P/100

		PU59090-25	DEFLECTION YOKE, INCL. RX1, RX2, C55
	RX1	QRD161J-0R0	CR
	OR	QRD161J-3R3	CR
	OR	QRD161J-7R2	CR
	RX2	QRD161J-0R0	CR
		QRD161J-684	CR
	C55	PU59090-47	PP CAP, 680 P/100
	OR	PU59090-48	PP CAP, 1000 P/100
	OR	PU59090-49	PP CAP, 1500 P/100
	OR	PU59090-50	PP CAP, 2000 P/100

# ⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
		PU59090-26	CRT, INCL. RX1, RX2, C55
	RX1	QRD161J-0R0	CR
	OR	QRD161J-3R3	CR
	OR	QRD161J-7R2	CR
	RX2	QRD161J-0R0	CR
		QRD161J-684	CR
	C55	PU59090-47	PP CAP, 680 P/100
	OR	PU59090-48	PP CAP, 1000 P/100
	OR	PU59090-49	PP CAP, 1500 P/100
	OR	PU59090-50	PP CAP, 2000 P/100

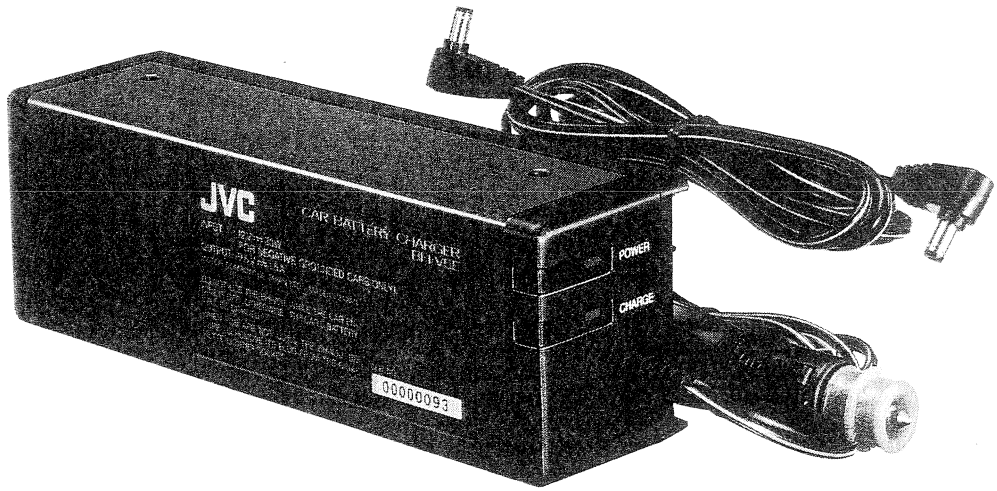
NOTE: RX1, RX2 AND C55 ARE INCLUDED IN FLYBACK TRANS SET, HL
SET, DEFLECTION YOKE AND CRT. WHEN THESE SETS AR
CHANGED: IF H SCAN SIZE MALFUNCTIONS BY INFLUENCE O
OTHER SETS, CHANGING THESE PARTS (RX1, RX2 OR C55), MAKE
NORMAL.

JVC

SERVICE MANUAL

CAR BATTERY CHARGER

BH-V5E



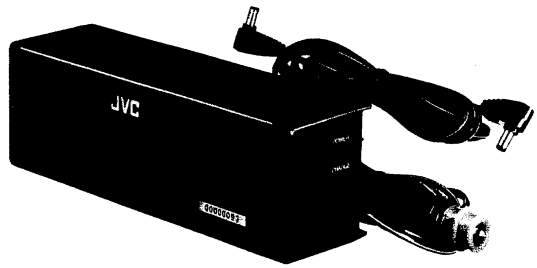
SPECIFICATIONS

Input	: DC 12 V ⎓ 30 W (Negative grounded cars only)
Output	: DC 9.6 V ⎓ , 1,5 A
Dimensions	: 57(W) x 69(H) x 195(D) mm (2-1/4" x 2-3/4" x 7-11/16")
Weight	: 540 g (1.19 lbs)

No. 8458 (2/5)
July 1986

INSTRUCTIONS
MANUEL D'INSTRUCTIONS
BEDIENUNGSANLEITUNG
MANUAL DE INSTRUCCIONES
GEBRUIKSAANWIJZING

BH-V5E
CAR BATTERY CHARGER
CHARGEUR DE BATTERIE A PARTIR DE LA VOITURE
AUTOBATTERIE-LADEGERÄT
CARGADOR DE BATERIA DEL AUTOMOVIL
AUTOAKKU-OPLADER



Specifically for the BH-V5E
Special pour le BH-V5E
Für Modellausführung BH-V5E
Especialmente para la BH-V5E
Speciaal voor de BH-V5E

PU30425-858

JVC

Thank you for purchasing the JVC **BH-V5E** Car Battery Charger. This unit plugs into a car's cigarette lighter socket to charge NB-P5U, NB-P6U, NB-P7U and NB-P8U Battery Packs, for exclusive use with the JVC VideoMovie. It can also be used to provide DC power for the JVC **GR-C1/GR-C2/GR-C7** VideoMovie. To avoid problems and obtain the best results, please read this instruction booklet carefully before use.

CAUTION
To prevent electric shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified service personnel.

WARNING—DANGEROUS VOLTAGE INSIDE

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.
This unit should be used with DC 12 V ⎓ only.
(FOR NEGATIVE GROUNDED CARS ONLY)
CAUTION:
To prevent electric shocks and fire hazards, do NOT use any other power source.

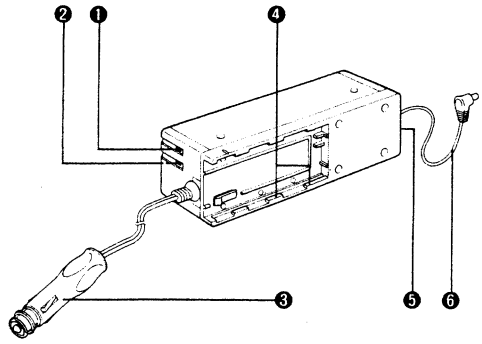
NOTE:
The rating plate (serial number plate) is on the side of the unit.

PRECAUTIONS

- As a car battery adapter/charger, the **BH-V5E** is used exclusively with the JVC **GR-C1/GR-C2/GR-C7** VideoMovie.
- Prevent inflammables, water and metallic objects from entering the unit.
- Do not disassemble or modify the unit.
- Do not apply shocks to the unit.
- Do not subject the unit to direct sunlight.
- Avoid using the unit in extremely hot or humid places.
- Avoid using the unit in places subject to excessive vibrations.
- When not in use, remove the plug of the **BH-V5E** from the lighter socket.
- Do not use the **BH-V5E** near the car's antenna or car audio components. It may cause sound interference.
- Remove the charger's plug from the lighter socket before starting the car's engine and when the engine is turned off.
- The **BH-V5E** becomes hot while it is being used, but this is not due to any defect of this unit.
- Oscillations may be heard inside the **BH-V5E** while it is being used, but this is not due to any defect of this unit.
- When using such car accessories as the stereo, CB radio or air-conditioner, the **BH-V5E** may not operate because the car battery's voltage is too low. To solve this problem, remove the plug from the lighter socket, stop using the car accessories, and re-insert the plug.

Note:
If the cigarette lighter socket is dirty, it may not provide power and must be cleaned. To prevent shock, clean it with non-metallic materials.

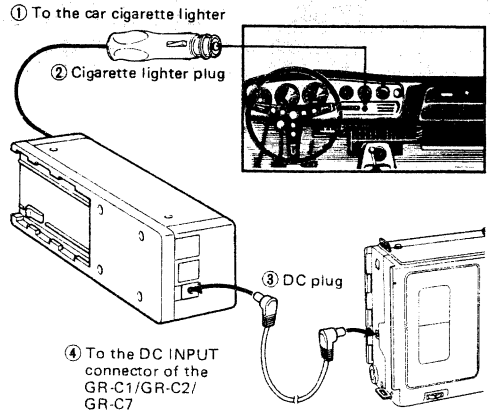
IDENTIFICATION



❶ **POWER indicator**
Lights when the cigarette lighter plug is inserted into a car's lighter socket.
❷ **CHARGE indicator**
Remains lighted during charging and goes off when charging is completed.
❸ **Cigarette lighter plug**
❹ **Terminals**
❺ **DC output connector**
❻ **DC cord**

Charging time
NB-P5U: Approx. 60 minutes (This special type of battery requires a long charging time.)
NB-P6U: Approx. 35 minutes
NB-P7U: Approx. 50 minutes
NB-P8U: Approx. 90 minutes
- The charging time differs depending on the ambient temperature and condition of the battery pack.

PROVIDING POWER FOR THE GR-C1/GR-C2/GR-C7 VIDEOMOVIE

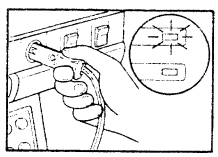


1. Keep the car engine idling.
2. Remove the car cigarette lighter and insert the cigarette lighter plug of the **BH-V5E.** (The power indicator will light.)
3. Insert one plug of the DC cord into the DC output connector of the **BH-V5E**, and the other plug into the DC input connector of the **GR-C1/GR-C2/GR-C7.**
4. Pressing the POWER button of the **GR-C1/GR-C2/GR-C7** to ON will switch on the power.
   - When starting the car engine, the POWER button of the **GR-C1/GR-C2/GR-C7** should be OFF.
   - When removing either the DC plug or the cigarette lighter plug, the POWER button of the **GR-C1/GR-C2/GR-C7** should be OFF.

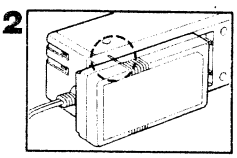
Note:
The **BH-V5E** cannot be used to power VideoMovie while a battery pack is attached for recharging.

CHARGING THE BATTERY PACK

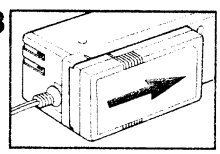
CAUTION:
- Use the **BH-V5E** only when the car is idling or when the car is being driven. Otherwise, the car's battery will be drained.

1 

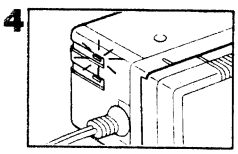
Remove the car cigarette lighter from its socket and insert the **BH-V5E's** lighter plug. (The power indicator will light.)

2 

Align the marks.

3 

Slide the battery pack in the direction of the arrow until it locks in place.

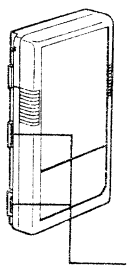
4 

When charging is completed, the CHARGE indicator goes off.
- Faint oscillations may be heard at the start of charging. This is not due to any defect of the unit.

CAUTION
- The battery pack becomes warm immediately after being charged. This is not due to any defect of the unit.

A WORD ON THE EXCLUSIVE NB-P5U/NB-P6U/NB-P7U/NB-P8U BATTERY PACKS

The NB-P5U/NB-P6U/NB-P7U/NB-P8U are nickel-cadmium batteries. Give attention to the following to make the most of their characteristics.



Temperature ranges:
The recharging time is based on room temperature of 20°C (68°F).
The lower the temperature, the longer the recharging time.

For charging:
10°C to 35°C (50°F – 95°F)
For operating:
-10°C to 40°C (14°F – 104°F)
For storing:
-10°C to 30°C (14°F – 86°F)

THE BATTERY IS KEPT UNCHARGED FOR SHIPMENT. CHARGE IT BEFORE USE.

- To avoid hazard:
  1. Do not burn.
  2. Do not short circuit the terminals.
  3. Do not modify or disassemble.
  4. Use only specified chargers.
- To prevent damage and prolong service life:
  1. Avoid dropping, unnecessary shocks.
  2. Avoid repeated charging without discharging.
- This unit has a limited service life:
  Near the end of its service life, when it begins to deliver less recording time per charge, purchase a replacement.
- It is normal for the unit to be warm after charging or use.
- This is a chemical reaction type battery; its properties are best maintained under the following conditions.
  1. Optimum charging takes place at temperatures between 10°C (50°F) and 35°C (95°F). Cooler temperatures impede chemical reaction. Warmer temperatures can prevent complete charging.
  2. Store in a cool dry place. Extended exposure to high temperatures will increase natural discharge and shorten service life.
  3. Total natural discharge may occur during long storage periods (uncharged storage is preferable; recharge one day before use.)
  4. Remove from charger or powered unit when not in use; some machines use current even when switched off.

If malfunctioning occurs, stop using the unit immediately, unplug the power cord and consult your local JVC dealer.

SPECIFICATIONS

Input	: DC 12 V ⎓ 30 W (Negative grounded cars only)
Output	: DC 9.6 V ⎓ , 1,5 A
Dimensions	: 57(W) x 69(H) x 195(D) mm (2-1/4" x 2-3/4" x 7-11/16")
Weight	: 540 g (1.19 lbs)

BH-V5E

1. DESCRIPTION OF CAR BATTERY CHARGER

The BH-V5E Car Battery Charger acceptas power from a 12 V car battery and can be used to charge the NB-P5U/6U/7U Battery Packs and operate the VideoMovie, etc. Power from the car's cigarette lighter socket is converted to 9.6 V by a forward-style DC/DC converter and is supplied to the connected load.

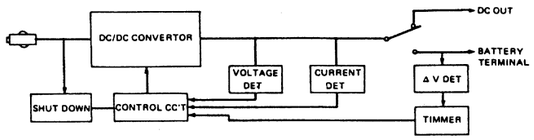


Fig. 1-1

The required input voltage is input to the control circuit together with the output current and type of battery to be charged. This circuit controls the DC/DC converter according to this data.

1. Shut-down circuit

When the input voltage falls below a fixed value (10 V), this interrupts the operation of the charger so as to protect the car battery.

2. Voltage detection circuit

This regulates the output so it does not exceed 18 V during charging and 12 V during VTR operation, even if a malfunction occurs.

3. Current detection circuit

This operates the protective circuit at 1.1 A when charging the NB-P5U, at 1.5 A when charging the BN-P6U/7U/8U and at 2 A at peaks when operating a VTR. This circuit gives protection against overloads.

4. ΔV detection and timer circuits

These circuits detect ΔV when charging a battery. When ΔV becomes wrong during operation, the circuit stops forcibly 120 minutes after the start of charging.

2. DISMANTLING PROCEDURE

2.1 EXTERNAL COVER AND CIRCUIT BOARD REMOVAL

1. Remove 4 screws (1) to remove the top cover. (Refer to Fig. 2-1.)

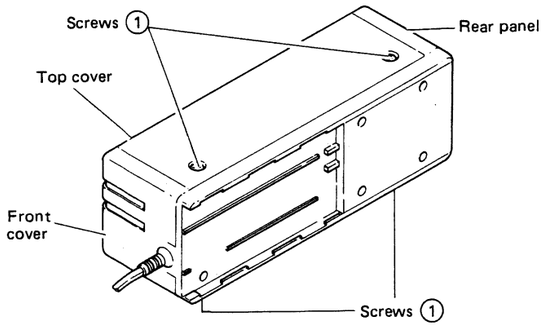


Fig. 2-1

2. To remove the front and rear panels, lift up while pressing heat sink after the top cover has been removed. Remove screw (2) shown in Fig. 2-2 to remove the LED board.
3. Remove screws (3) and (4) . Now lift the heat sink to remove connector (A) . The main board can now be removed.

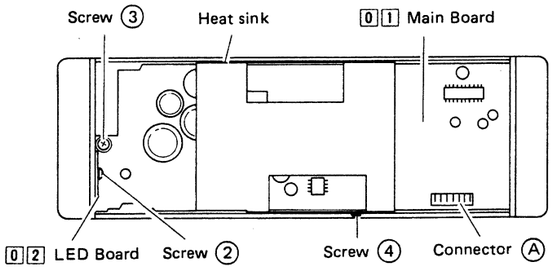


Fig. 2-2

4. After the main Board is removed, remove screws (5) and the shield case as shown in Fig. 2-3. Now the sub-board can be removed.

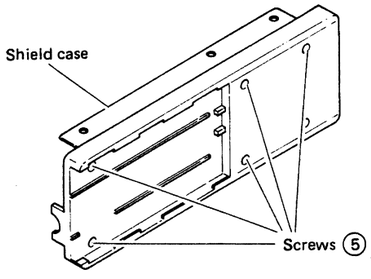
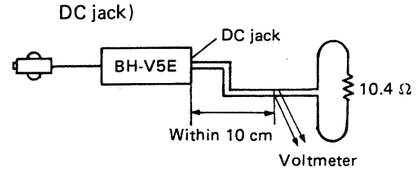
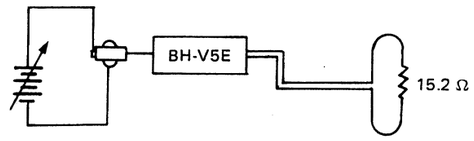


Fig. 2-3

3. ELECTRICAL ADJUSTMENTS

No.	Item	Check Point	Adjustment Parts	Mode/Conditions	Adjustments & Confirmations
1	Adjustment of output voltage	Battery terminal	RV1 [0][1] Main board	NB-P6U mode NB-P6U mode NB-P6U mode	1) Operate the charger with an input voltage of 10.5 V. 2) Adjust the load so that the battery terminal voltage is 10 – 12 V. Turn RV1 so that the current is 1.5 A. 3) After adjusting the load for the specified voltage, confirm that the charging current is 1.1 ± 0.1 A.
2	Adjustment of output voltage	DC cord (within 10 cm of the DC jack)	RV2 [0][1] Main board	VTR mode	1) Operate the charger with an input voltage of 10.5 V. 2) Insert the DC cord into a DC jack to connect a load of 10.4 ± 0.1 ohms. 3) Install a voltmeter within 10 cm from the jack. Adjust RV2 to set to voltage to 10.4 V. 4) When the resistance is between 5.2 and 10.4 ohms, confirm that the output voltage exceeds 9.7 V.
3	Adjustment of shut-down voltage	Between anode of D20 and GND	RV3 [0][1] Main board	VTR mode	1) Ground the cathode of D20 on the main board. 2) Turn RV3 fully counterclockwise. 3) Connect an oscilloscope between the anode of D20 and GND. 4) Set a load resistance which allows 2A to flow to the DC jack. (Approx. 5.2 ohms) 5) Set the input voltage to 9.95 V. 6) Turn RV3 clockwise to adjust the oscilloscope waveform to 100 mV. 7) Operate the charger at 12 V and connect C41 to the DC jack as a load. 8) Gradually decrease the input voltage just before shut-down is 9.95 ± 0.1 V.
4	Adjustment of the timer	RV4 Center lead	RV4 [0][1] Main board	NB-P5U mode	1) Operate the charger with an input of 12 V. 2) Adjust the load so tha battery terminal voltage becomes 13 V. 3) Attach a frequency counter between GND and the center lead of RV4 and adjust RV4 so taht th cycle is 439 msec.

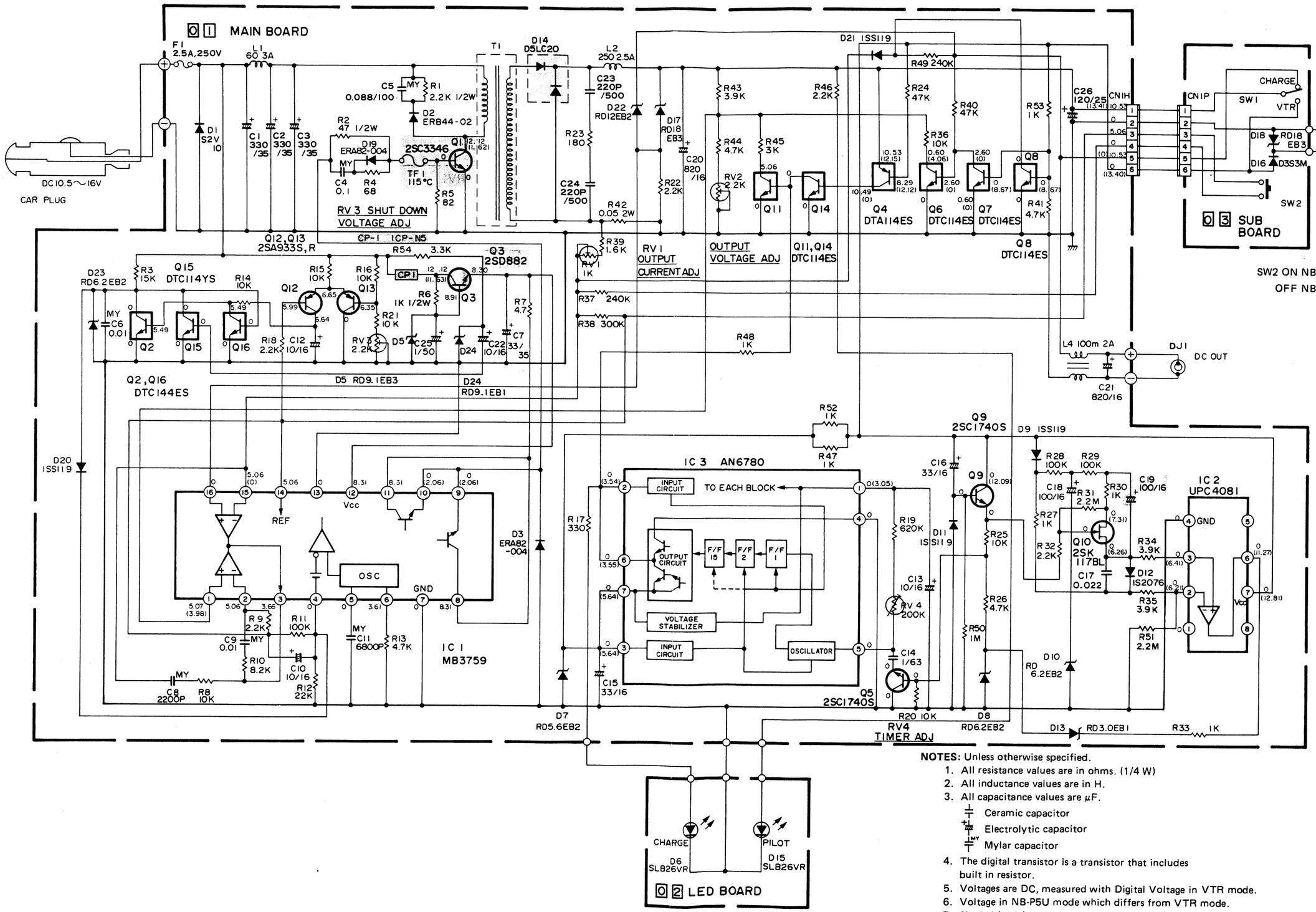




Mode	SW 1	SW 2
NB-P5U	Press.	Do not press.
NB-P6U	Press.	Press.
VTR	Do not press.	Do not press.

4. SCHEMATIC AND CIRCUIT BOARD DIAGRAM

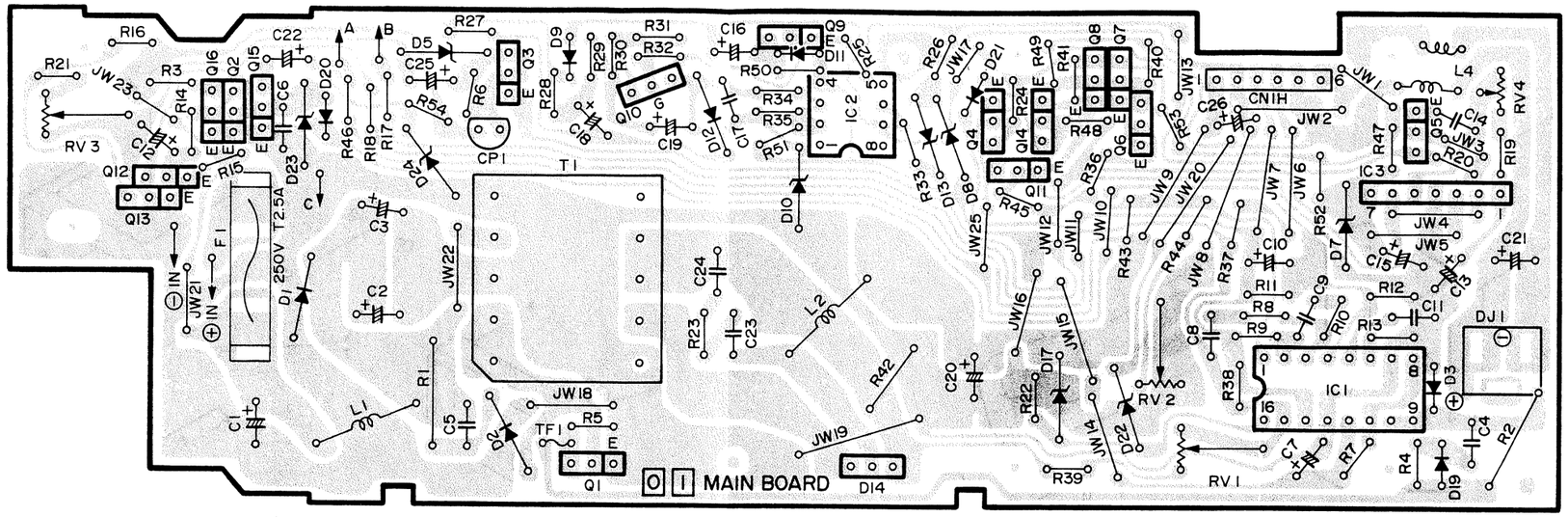
4.1 SCHEMATIC DIAGRAM

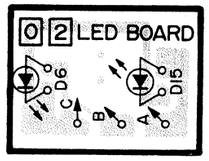


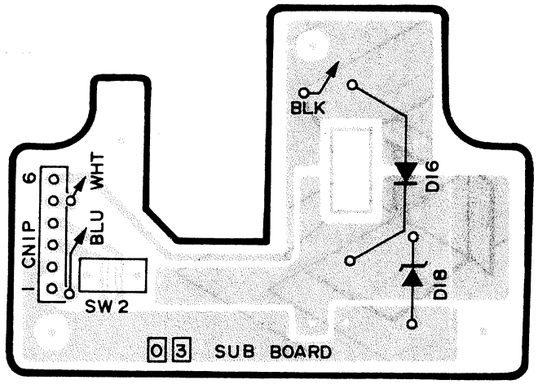
NOTES: Unless otherwise specified.

1. All resistance values are in ohms. (1/4 W)
2. All inductance values are in H.
3. All capacitance values are μF.
   - Ceramic capacitor
   - Electrolytic capacitor
   - MY Mylar capacitor
4. The digital transistor is a transistor that includes built in resistor.
5. Voltages are DC, measured with Digital Voltage in VTR mode.
6. Voltage in NB-P5U mode which differs from VTR mode.
7. Shaded ( ) parts are critical for safety. Replace only with specified parts.

4.2 CIRCUIT BOARD







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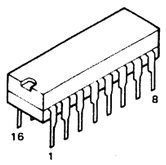

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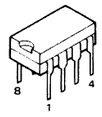

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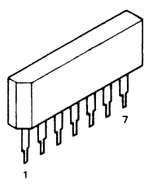

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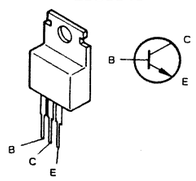

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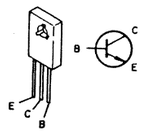
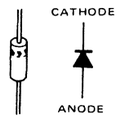


ERB44-02



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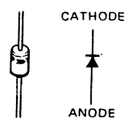

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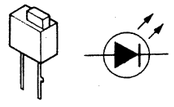

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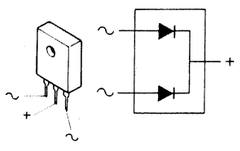

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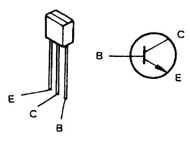
2SC1740S
DTC114ES



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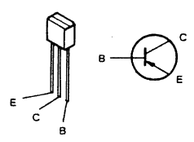
2SA933S,R



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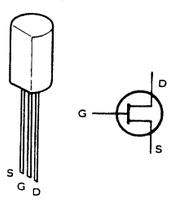

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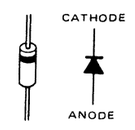
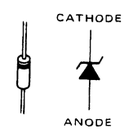
D3S3M

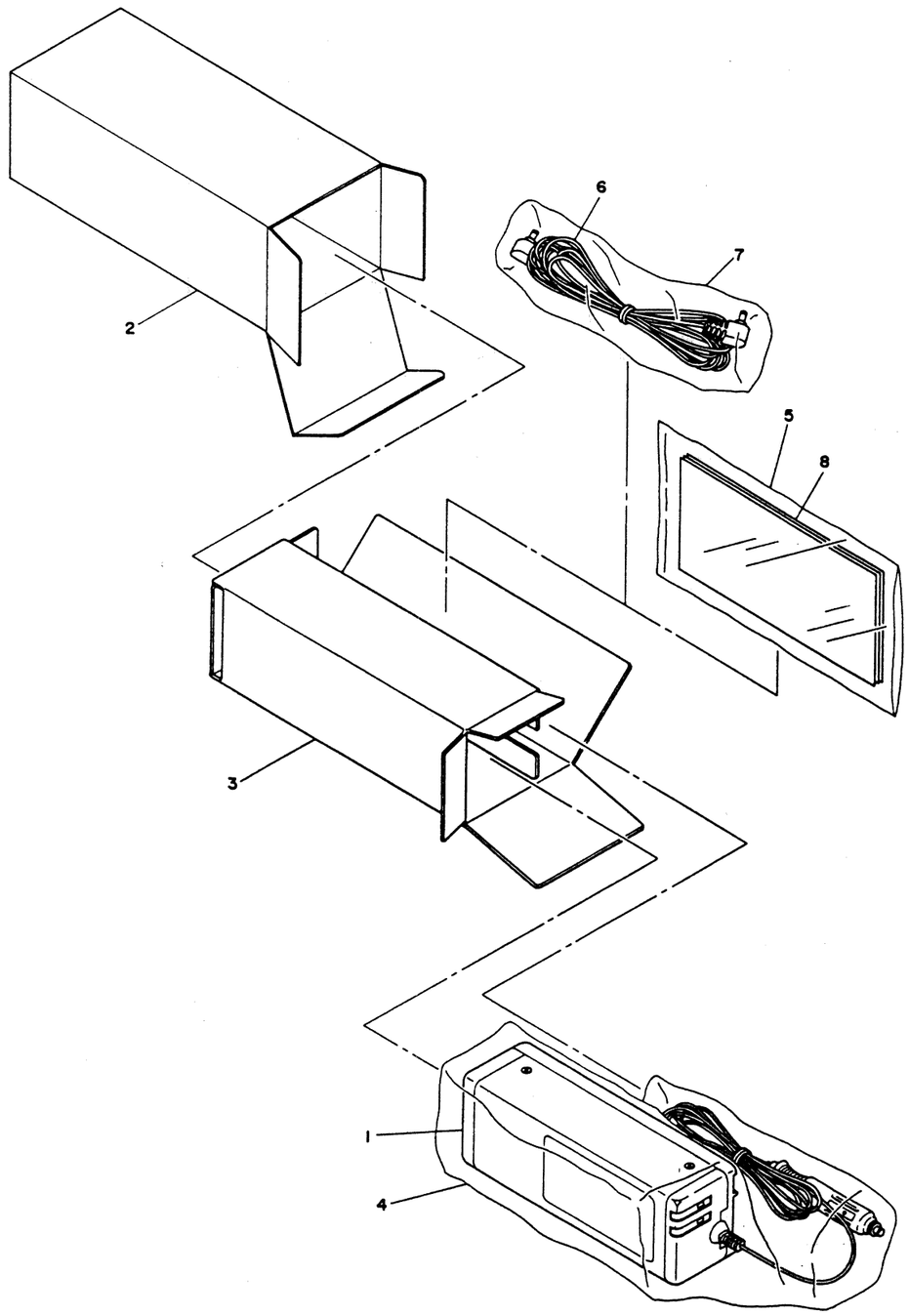


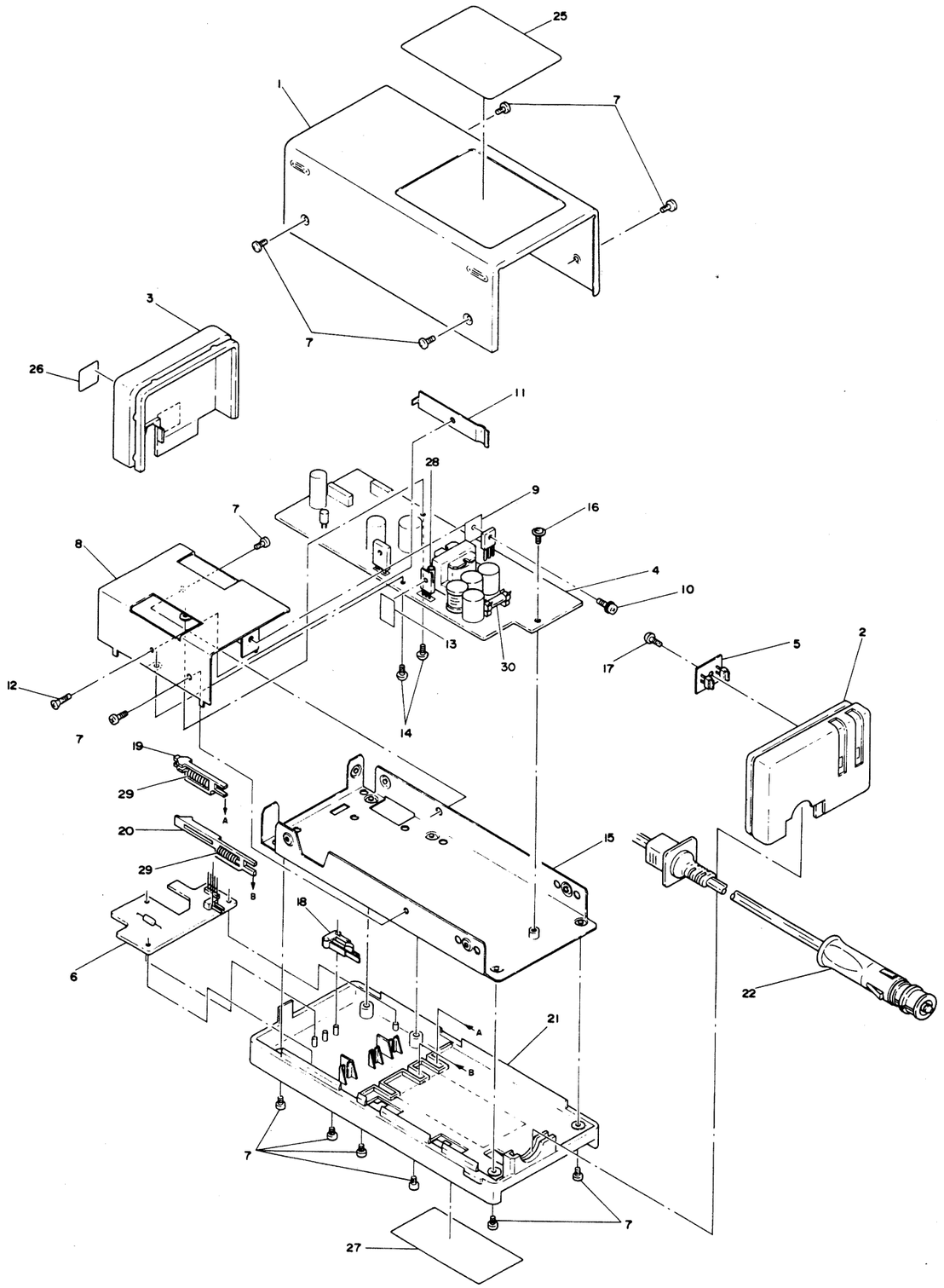
RD9.1EB3
RD5.6EB2
RD6.2EB2
RD3.0EB1
RD18EB3
RD12EB2



BH-3

5. EXPLODED VIEWS





BH-4

6. PARTS LIST

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			PACKING ASSEMBLY [M1]
⚠	1	–	CAR BATTERY CHARGER ASSEMBLY
	2	PU22249-3	PACKING CASE
	3	PQ10325-007	PACKING
	4	PQ10325-008	POLY BAG (A), FOR BH-V5E
	5	PQ10325-009	POLY BAG (B), FOR INSTRUCTION BOOK
	6	PQ10325-027	DC CORD ASS'Y
	7	PQ10325-011	POLY BAG (C) FOR DC CORD
⚠	8	PU30425-858	INSTRUCTION BOOK
			CAR BATTERY CHARGER ASSEMBLY [M2]
⚠	1	PU35879-3	TOP COVER
⚠	2	PU36023-2	FRONT COVER
⚠	3	PQ10243-101	REAR PANEL
	4	–	MAIN BOARD ASSEMBLY
	5	–	L.E.D BOARD ASSEMBLY
	6	–	SUB BOARD ASSEMBLY
	7	PU11061-006	SCREW, X2 M3X4
	8	PQ10325-012	HEAT SINK
	9	PQ10325-013	SHEET (A), FOR Q3
	10	DPSP3006M	SCREW, M3X6
	11	PQ10325-014	HOLDER, FOR Q1, D14
	12	SSSP3012M	SCREW, M3X12
	13	PQ10325-015	SHEET (B), FOR Q1
	14	SBSP2608M	TAPPING SCREW, M2.6X8
	15	PQ10325-016	SHIELD CASE
	16	DPSP3006M	SCREW, M3X6
	17	SBSG2606M	TAPPING SCREW, M2.6X8
	18	PQ10325-017	SWITCH, SW1
	19	PQ10325-018	SWITCH PIN (A), FOR SW2
	20	PQ10325-019	SWITCH PIN (B), FOR SW1
	21	PQ10325-020	BATTERY HOLDER ASSEMBLY
	22	PQ10325-036	CAR PLUG CORD
	23	–	–
	24	–	–
	25	–	RATING LABEL
	26	PU58520-3	REAR LABEL
	27	PU35870-1-5	CAUTION LABEL
	28	PQ10325-025	TUBE, FOR TF1
	29	PQ10325-026	SPRING, FOR SWITCH PIN, X2
	30	PQ10325-035	FUSE CLIP, X2

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PQ10325-037	MAIN BOARD ASSEMBLY [01]
	IC1	MB3759	INTEGRATED CIRCUIT
	IC2	UPC4081C	INTEGRATED CIRCUIT
	IC3	AN6780	INTEGRATED CIRCUIT
⚠	Q1	2SC3346	TRANSISTOR
	Q2	DTC144ES	DIGITAL TRANSISTOR
⚠	Q3	2SD882P	TRANSISTOR
	Q4	DTA114ES	DIGITAL TRANSISTOR
	Q5	2SC1740S	TRANSISTOR
	Q6	DTC114ES	DIGITAL TRANSISTOR
	Q7	DTC114ES	DIGITAL TRANSISTOR
	Q8	DTC114ES	DIGITAL TRANSISTOR
	Q9	2SC1740S	TRANSISTOR
	Q10	2SK117BL	F.E.T
	Q11	DTC114ES	DIGITAL TRANSISTOR
	Q12	2SA933S,R	TRANSISTOR
	Q13	2SA933S,R	TRANSISTOR
	Q14	DTC114ES	DIGITAL TRANSISTOR
	Q15	DTC144YS	DIGITAL TRANSISTOR
	Q16	DTC144ES	DIGITAL TRANSISTOR
	D1	D1V20	DIODE
	D2	ERB44-02	DIODE
	D3	ERA82-004	DIODE
	D4	–	–
	D5	RD9.1EB3	ZENER DIODE, VZ=9.1V
	D6	–	–
	D7	RD5.6EB2	ZENER DIODE, VZ=5.6V
	D8	RD6.2EB2	ZENER DIODE, VZ=6.2V
	D9	1SS119	DIODE
	D10	RD6.2EB2	ZENER DIODE, VZ=6.2V
	D11	1SS119	DIODE
	D12	1S2076	DIODE
	D13	RD3.0EB1	ZENER DIODE, VZ=3.0V
	D14	D5LC20	DIODE
	D15	–	–
	D16	–	–
	D17	RD18EB3	ZENER DIODE, VZ=18V
	D18	–	–
	D19	ERA82-004	DIODE
	D20	1SS119	DIODE
	D21	1SS119	DIODE
	D22	RD12EB2	ZENER DIODE, VZ=12V
	D23	RD6.2EB2	ZENER DIODE, VZ=6.2V
	D24	RD9.1EB1	ZENER DIODE, VZ=9.1V
	C1	PQ10325-114	E CAP, 330/35
	C2	PQ10325-114	E CAP, 330/35
	C3	PQ10325-114	E CAP, 330/35
	C4	QFN31HK-104Z	MY CAP, 0.1
	C5	PQ10325-103	MY CAP, 0.068/100
	C6	QFN31HK-103Z	MY CAP, 0.01
	C7	PQ10325-104	E CAP, 33/35
	C8	QFN31HK-222Z	MY CAP, 2200P
	C9	QFN31HK-103Z	MY CAP, 0.01
	C10	PQ10325-105	E CAP, 10/16

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C11	QFN31HK-682Z	MY CAP, 6800P
	C12	PQ10325-105	E CAP, 10/16
	C13	PQ10325-105	E CAP, 10/16
	C14	QFZ9011-105	PP CAP, 1
	C15	PQ10325-104	E CAP, 33/16
	C16	PQ10325-104	E CAP, 33/16
	C17	QFN31HK-223Z	MY CAP, 0.022
	C18	PQ10325-107	E CAP, 100/16
⚠	C19	PQ10325-108	E CAP, 100/16
	C20	PQ10325-109	E CAP, 820/16
	C21	PQ10325-109	E CAP, 820/16
	C22	PQ10325-112	E CAP, 10/16
	C23	PQ10325-110	C CAP, 220P/500
	C24	PQ10325-110	C CAP, 220P/500
	C25	PQ10325-111	E CAP, 1/50
	C26	PQ10325-113	E CAP, 120/25
	R1	PQ10325-131	CR, 2.2 K 1/2 W
	R2	PQ10325-132	CR, 47 1/2W
	R3	QRD141J-153	CR, 15K 1/4W
	R4	QRD141J-680	CR, 68 1/4W
	R5	QRD141J-820	CR, 82 1/4W
	R6	PQ10325-134	CR, 1K, 1/2 W
	R7	QRD141J-4R7	CR, 4.7 1/4W
	R8	QRD141J-103	CR, 10K 1/4W
	R9	QRD141J-222	CR, 2.2K 1/4W
	R10	QRD141J-822	CR, 8.2K 1/4W
	R11	QRD141J-104	CR, 100K 1/4W
	R12	QRD141J-223	CR, 22K 1/4W
	R13	QRD141J-472	CR, 4.7K 1/4W
	R14	QRD141J-103	CR, 10K 1/4W
	R15	QRD141J-103	CR, 10K 1/4W
	R16	QRD141J-103	CR, 10K 1/4W
	R17	QRD141J-331	CR, 330 1/4W
	R18	QRD141J-222	CR, 2.2K 1/4W
	R19	QRD141J-624	CR, 620K 1/4W
	R20	QRD141J-103	CR, 10K 1/4W
	R21	QRD141J-103	CR, 10K 1/4W
	R22	QRD141J-222	CR, 2.2K 1/4W
	R23	QRD141J-181	CR, 180 1/4W
	R24	QRD141J-473	CR, 47K 1/4W
	R25	QRD141J-103	CR, 10K 1/4W
	R26	QRD141J-472	CR, 4.7K 1/4W
	R27	QRD141J-102	CR, 1K 1/4W
	R28	QRD141J-104	CR, 100K 1/4W
	R29	QRD141J-104	CR, 100K 1/4W
	R30	QRD141J-102	CR, 1K 1/4W
	R31	QRD141J-225	CR, 2.2M 1/4W
	R32	QRD141J-222	CR, 2.2K 1/4W
	R33	QRD141J-102	CR, 1K 1/4W
	R34	QRD141J-392	CR, 3.9K 1/4W
	R35	QRD141J-392	CR, 3.9K 1/4W
	R36	QRD141J-103	CR, 10K 1/4W
	R37	QRD141J-244	CR, 240K 1/4 W
	R38	QRD141J-304	CR, 300K 1/4 W
	R39	QRD141J-162	CR, 1.6K 1/4 W
	R40	QRD141J-473	CR, 47K 1/4W

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R41	QRD141J-472	CR, 4.7K 1/4W
	R42	PQ10325-113	UNFLAMMABLE R, 0.05 2W
	R43	QRD141J-392	CR, 3.9K 1/4W
	R44	QRD141J-472	CR, 4.7K 1/4W
	R45	QRD141J-302	CR, 3K 1/4W
	R46	QRD141J-222	CR, 2.2K 1/4W
	R47	QRD141J-102	CR, 1K 1/4W
	R48	QRD141J-102	CR, 1K 1/4W
	R49	QRD141J-244	CR, 240K 1/4 W
	R50	QRD141J-105	CR, 1M 1/4W
	R51	QRD141J-225	CR, 2.2M 1/4W
	R52	QRD141J-102	CR, 1K 1/4W
	R53	QRD141J-102	CR, 1K 1/4W
	R54	QRD141J-332	CR, 3.3K 1/4W
	RV1	PQ10325-151	VR, OUTPUT CURRENT ADJ. 1KB
	RV2	PQ10325-152	VR, OUTPUT VOLTAGE ADJ. 2.2KB
	RV3	PQ10325-152	VR, SHUTDOWN ADJ. 2.2KB
	RV4	PQ10325-153	VR, TIMER ADJ. 200KB
	L1	PQ10325-161	CHOKE COIL, 60μ 3A
	L2	PQ10325-162	CHOKE COIL, 250μ 2.5A
	L3	–	–
	L4	PQ10325-163	CHOKE COIL, 100μ 2A
	T1	PQ10325-171	CONVERTER TRANSFORMER
⚠	TF1	PQ10325-172	THERMAL FUSE, 115°C 250 V 2A
⚠	CP1	ICP-N5	CIRCUIT TROTECTOR, 250 mA
⚠	F1	PQ10325-034	FUSE 250 V, T2.5A
	DJ1	PQ10325-173	DC JACK
	CN1H	PQ10325-174	CONNECTOR 6P HOUSING
		PQ10325-003	LED BOARD ASSEMBLY [02]
	D6	SLB26VR	L.E.D
	D15	SLB26VR	L.E.D
		PQ10325-006	SUB BOARD ASSEMBLY [03]
	D16	D3S3M	DIODE
	D18	RD18EB3	ZENER DIOED, VZ=18V
	SW2	PQ10325-175	SWITCH
	CN1P	PQ10325-176	CONNECTER, 6P BOARD POST

JVC

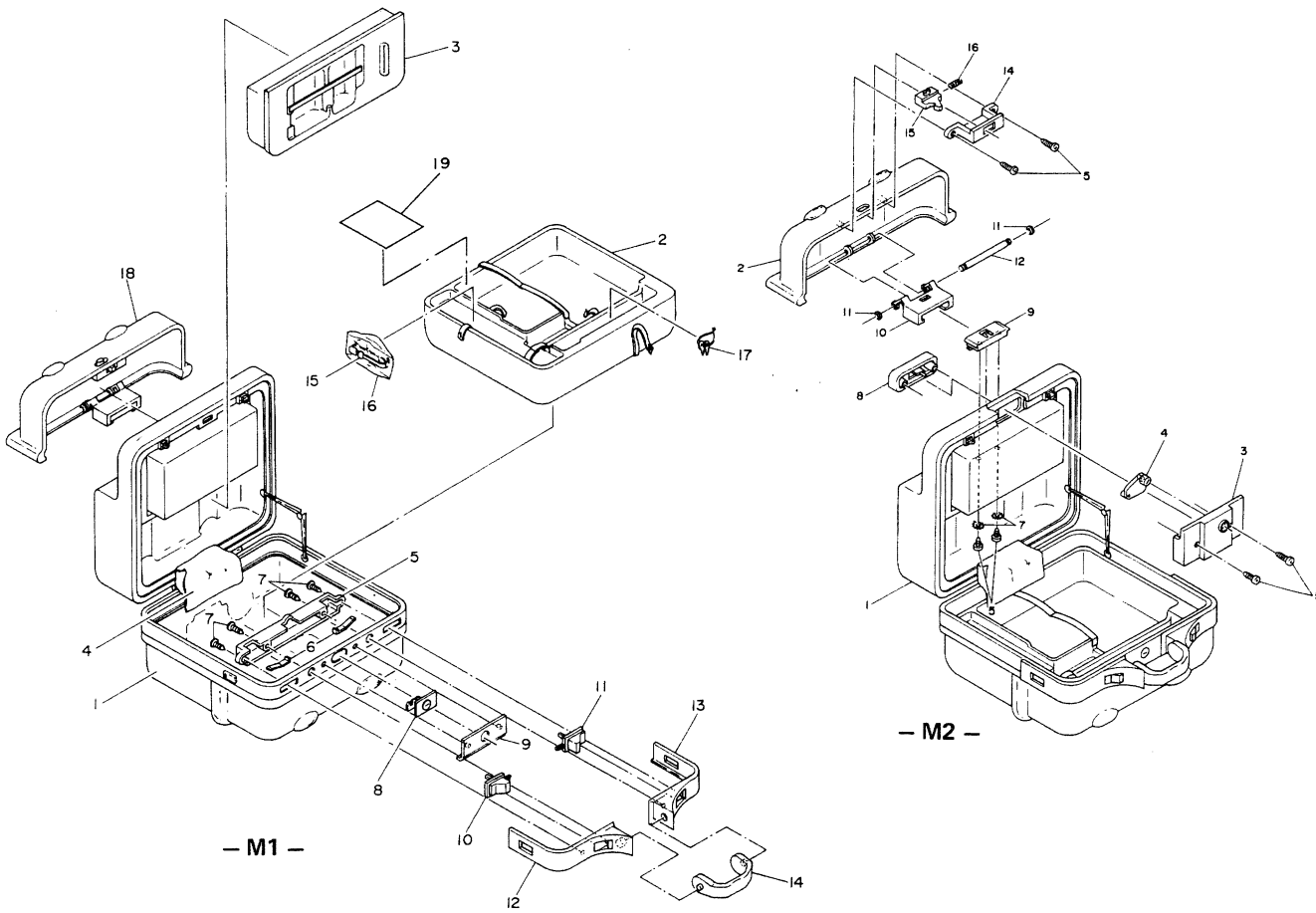
SERVICE MANUAL

CARRYING CASE

CB-V50U

No. 8458(3/5)
July 1986

EXPLODED VIEWS AND PARTS LIST

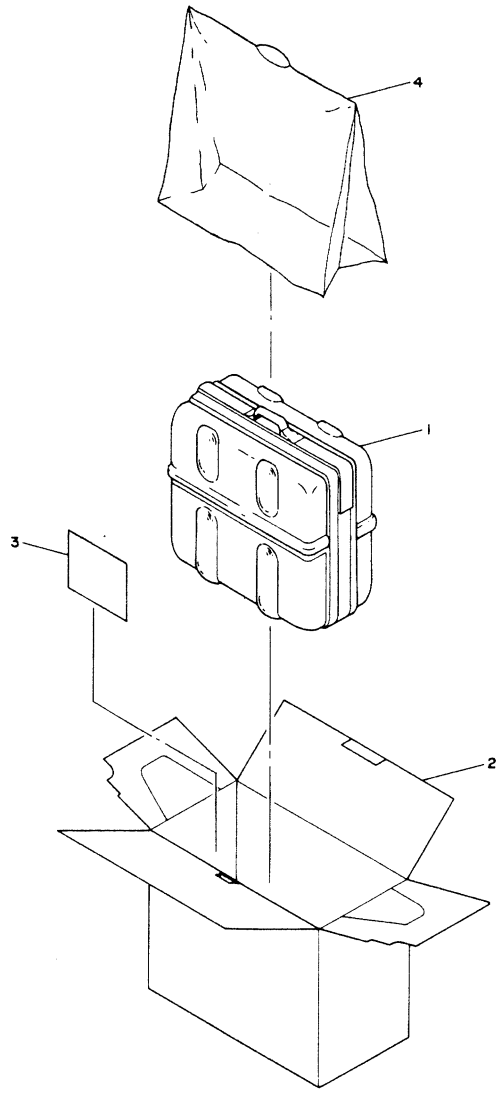


– PARTS LIST –

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			CARRYING CASE ASSEMBLY [M1]
	1	PQ10347-032	CASE ASSEMBLY
	2	PQ10347-002	LOWER CUSION ASSEMBLY
	3	PQ10347-003	UPPER CUSION ASSEMBLY
	4	PQ10347-004	HINGE COVER
	5	PQ10347-005	LOCK PLATE CASE
	6	PQ10347-006	PLATE SPRING
	7	PQ10347-007	SCREW, X 4
	8	PQ10347-008	CYLINDER LOCK
	9	PQ10347-009	HANDLE PLATE (1)
	10	PQ10347-010	LOCK BOTTON ASSEMBLY (2), LEFT SIDE
	11	PQ10347-011	LOCK BOTTON ASSEMBLY (1), RIGHT SIDE
	12	PQ10347-012	HANDLE PLATE (2), LEFT SIDE
	13	PQ10347-013	HANDLE PLATE (3), RIGHT SIDE
	14	PQ10347-014	HANDLE
	15	PU35752-5	SHOULDER BELT
	16	PQ10347-015	POLY BAG FOR SHOULDER BELT
	17	PQ10347-016	KEY
	18	–	COVER ASSEMBLY, REFER TO [M2]
	19	PU59493-2	CAUTION SHEET

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			CARRYING CASE ASSEMBLY [M2]
	1	–	CASE ASSEMBLY, REFER TO [M1]
	2	PQ20346-2	COVER
	3	PQ10347-017	BOTTOM COVER
	4	PQ10347-018	BOTTON LOCK
	5	PQ10347-007	SCREW, X 6
	6	–	–
	7	PQ10347-021	WASHER
	8	PQ10347-022	FRONT LOCK ADAPTOR
	9	PQ10347-023	HINGE COVER
	10	PQ10347-024	HINNGE HOLDER
	11	REE3500	E-RING
	12	PQ10347-025	HINGE SHUFT
	13	–	–
	14	PQ10347-027	FRONT LOCK COVER
	15	PQ10347-028	FRONT LOCK LEVER
	16	PQ10347-029	SPRING

PACKING ASSEMBLY



– PART LIST –

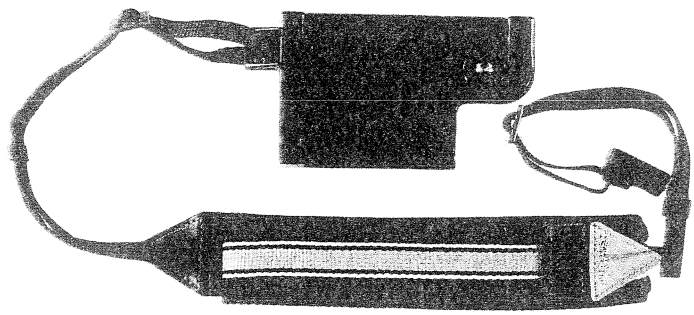
# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			CARRYING CASE ASSEMBLY [M3]
	1	–	CARRYING CASE ASSEMBLY [M1], [M2]
	2	PU11429-2	PACKING CASE
	3	PU36105-2	CAUTION SHEET
	4	PQ10347-030	POLY BAG

JVC

SERVICE MANUAL

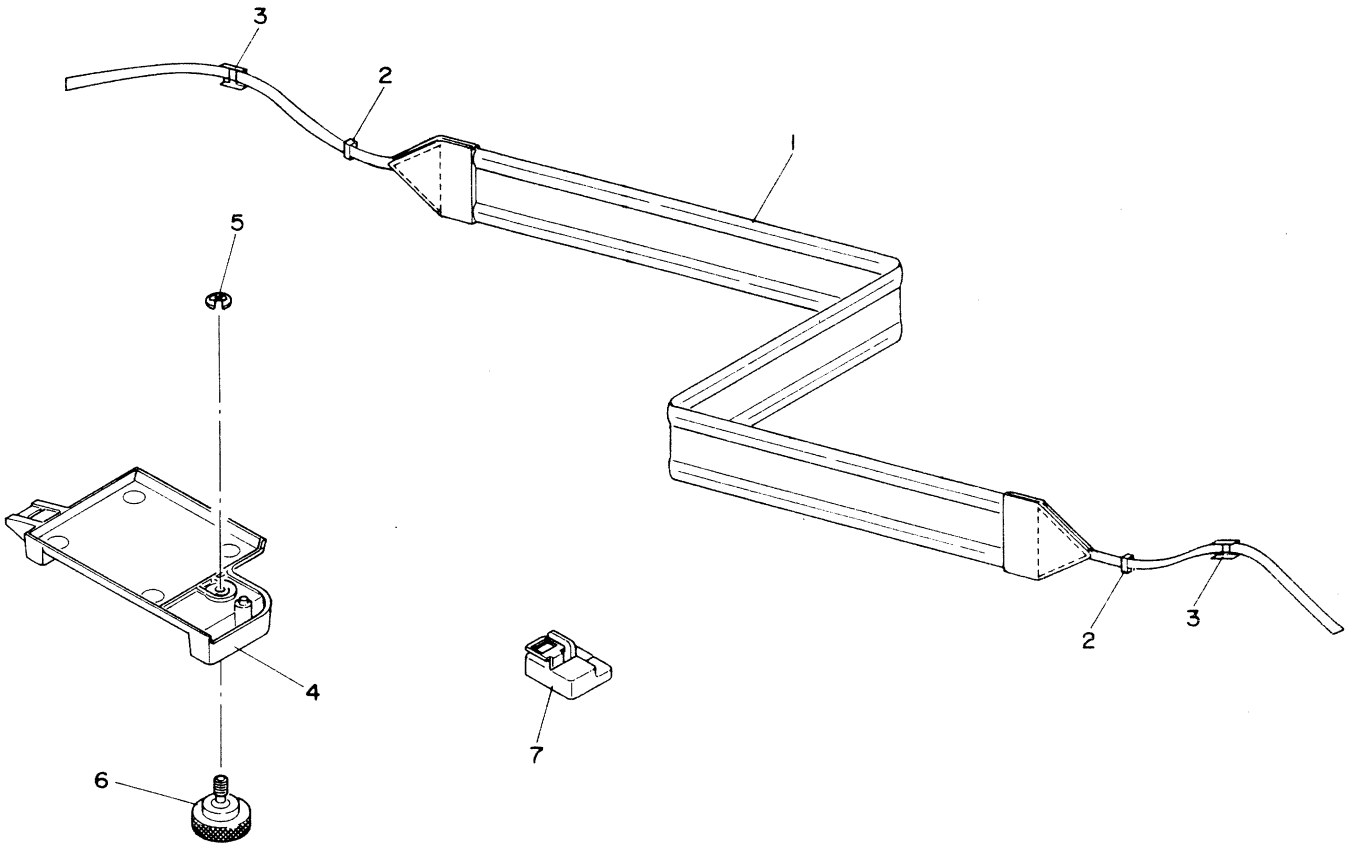
SHOULDER STRAP

VU-V17U



No. 8458(4/5)
July 1986

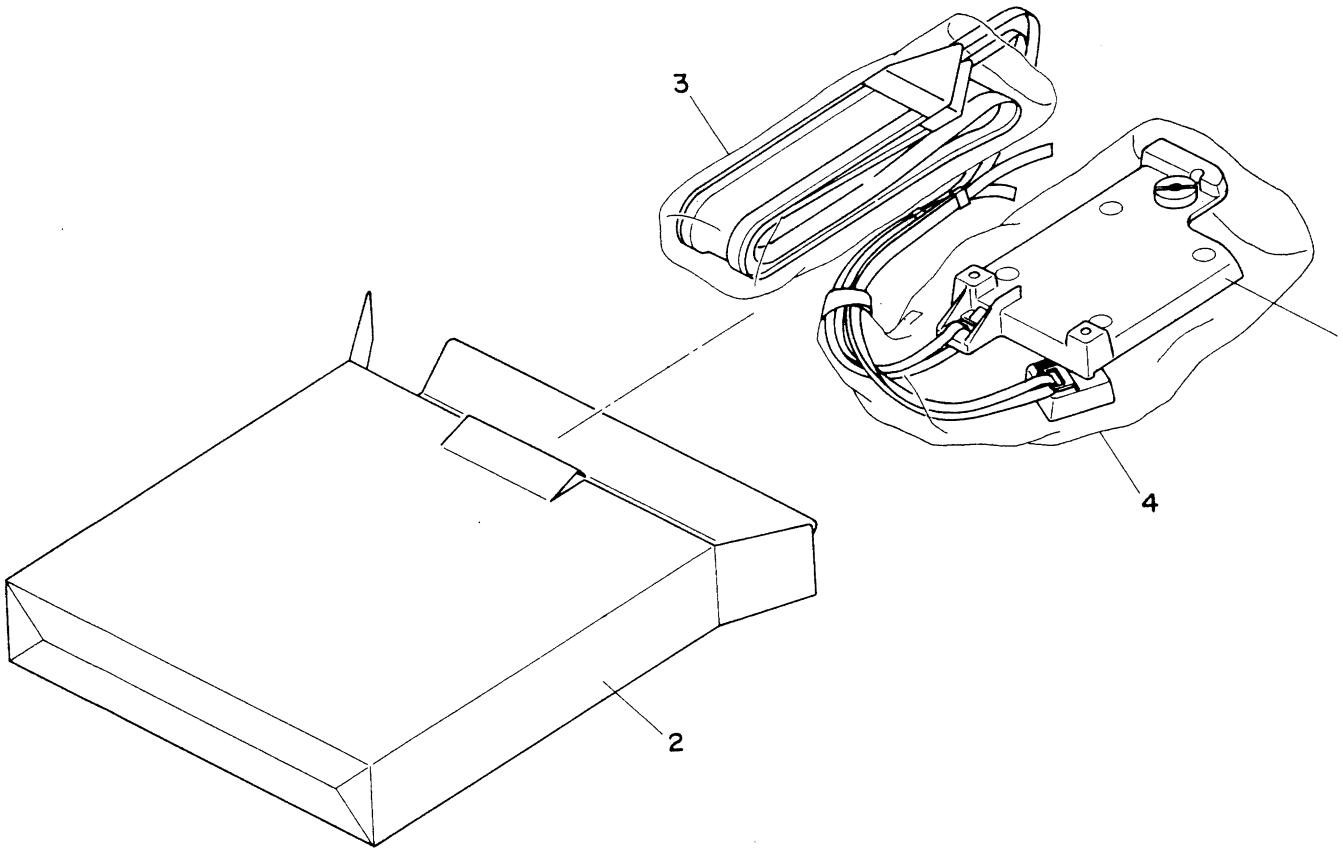
EXPLODED VIEWS AND PARTS LIST



– PART LIST –

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			SHOULDER STRAP ASSEMBLY [M1]
	1	PQ31394-2	SHOULDER BELT
	2	PQ10348-001	BELT HOLDER, X 2
	3	PQ10348-002	BELT ADJUSTER, X2
	4	PQ10348-003	GONDRA
	5	REE4000	E-RING
	6	PQ10348-004	CAMERA SCREW
	7	PQ10348-007	BUCKLE ASSEMBLY

PACKING ASSEMBLY



– PART LIST –

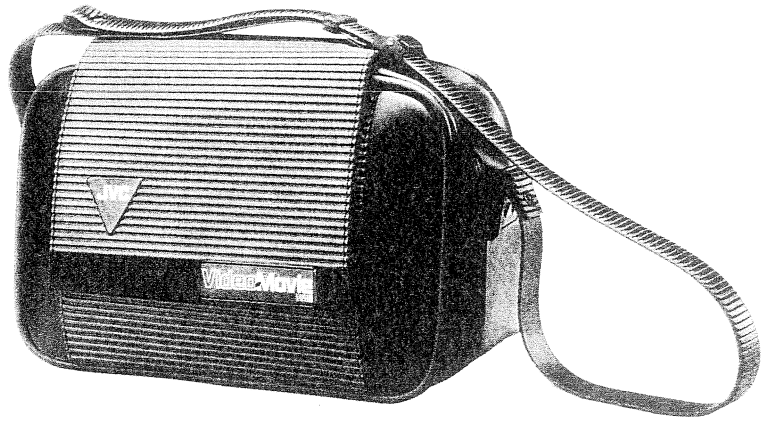
# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			SHOULDER STRAP ASSEMBLY [M2]
	1	–	SHOULDER STRAP ASSEMBLY, REFER TO [M1]
	2	PQ22335-2	PACKING CASE
	3	PQ10348-006	POLY BAG, FOR BELT
	4	PQ10348-005	POLY BAG, FOR GONDRA

JVC

SERVICE MANUAL

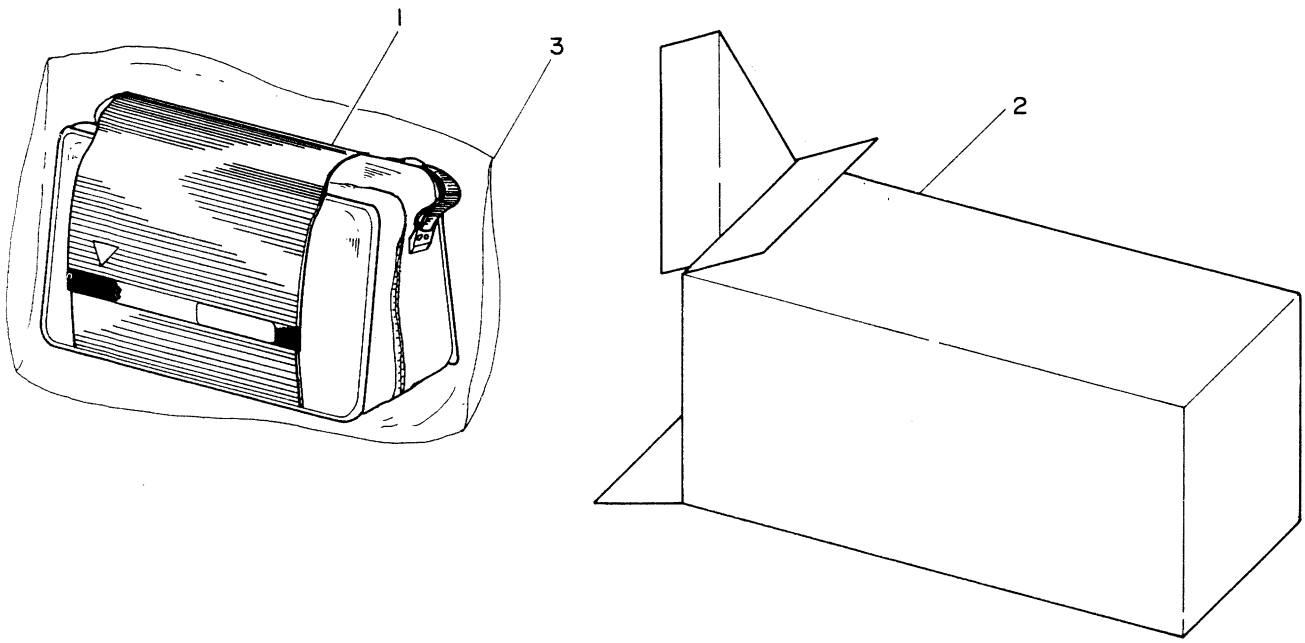
CARRYING BAG

CB-V21U



No. 8458(5/5)
July 1986

PACKING ASSEMBLY



– PART LIST –

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
			CARRYING BAG ASSEMBLY [M1]
	1	–	CARRYING BAG ASSEMBLY
	2	PU11431	PACKING CASE
	3	PQ10346-001	POLY BAG

ADDITION

MODEL GR-C7EG/EK

SECTION 4
DIAGRAMS AND CIRCUIT BOARDS

- MAIN
- Y/C
- SKEW JUMP
- OVERALL

SECTION 6
ELECTRICAL PARTS LIST

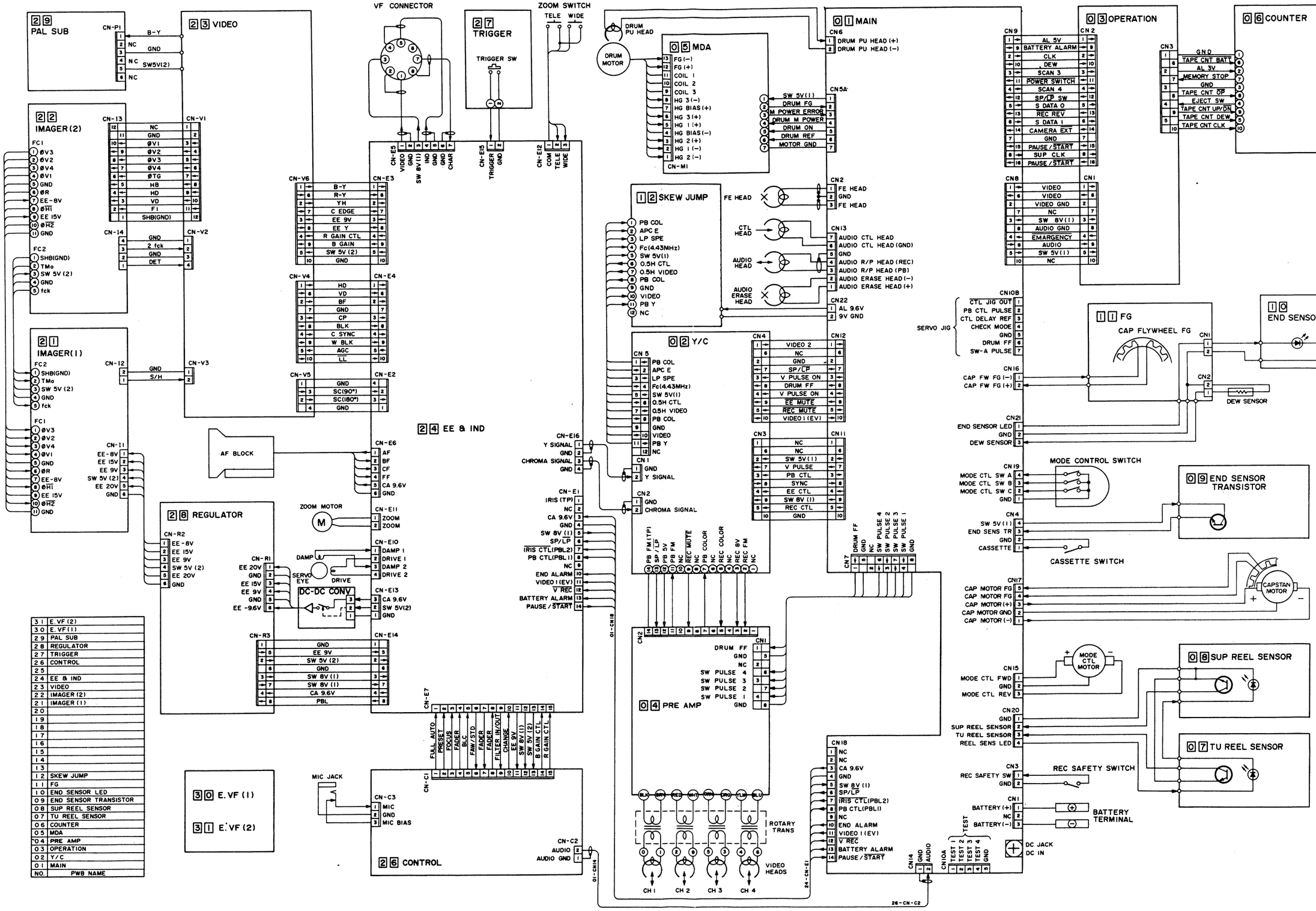
This is an addition to the No. 8458 Service Manual for the model GR-C7 EG/EK.

No. 8458B
March 1987

MAIN BOARD ASSEMBLY REPLACEMENT NOTES

1. If replacing an earlier MAIN board assembly ([0][1]) (PU11348F-1-C) with the later version, disconnect the connector CN1 on the END ALARM board assembly ([1][3]) (PU22483A-1-C).
2. If replacing a later MAIN board assembly (PU11348E-2-C, PU11348E-4-C or PU11348E-5-C) with the earlier version, install an END ALARM board assembly (PU22483A-1-C) and connect the connector CN1 on the END ALARM board assembly from MAIN board assembly.
   For location of the END ALARM board assembly, refer to "page 5-2" of the provided in GR-C7EG/EK Service manual (No. 8458).

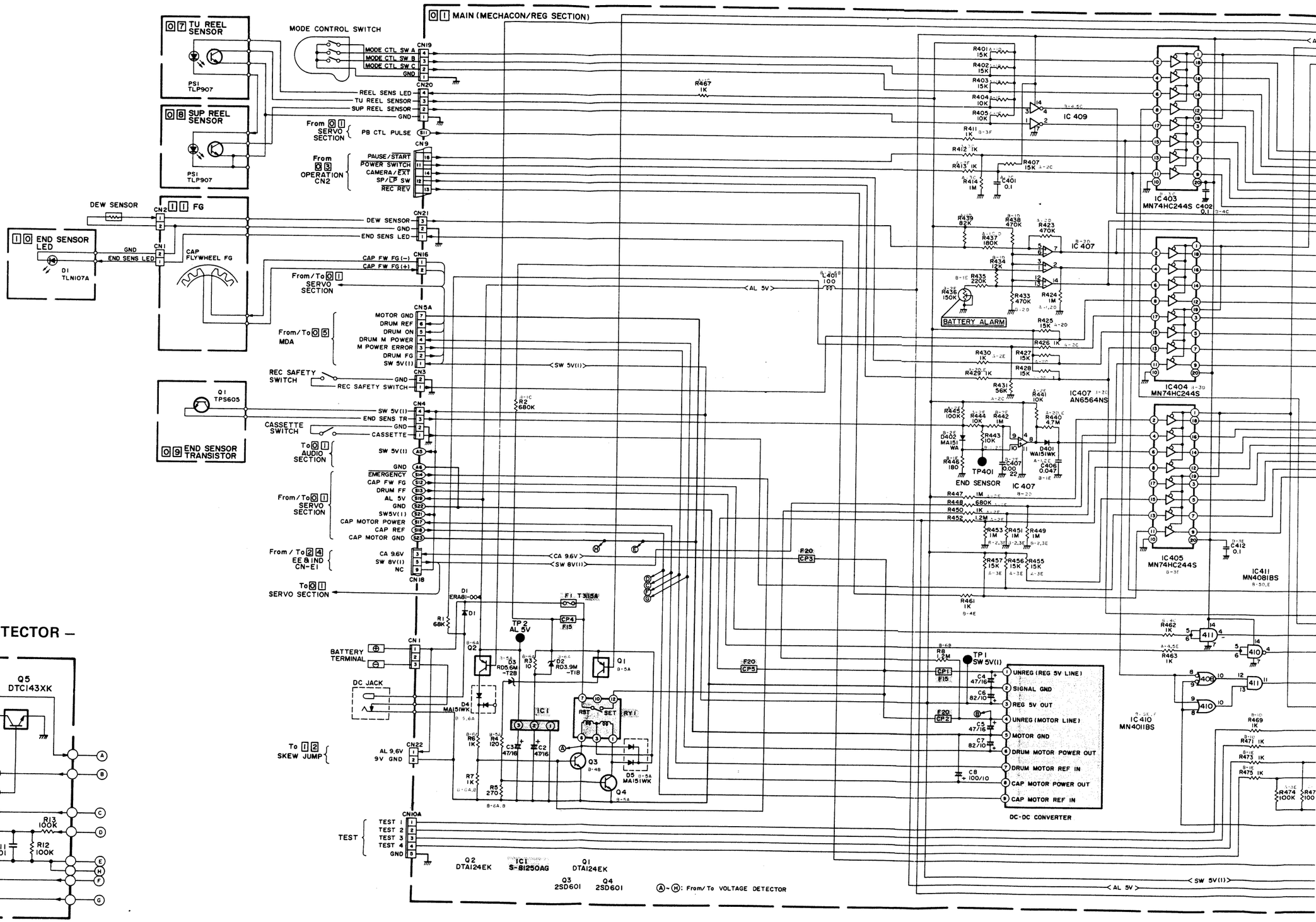
4.15 OVERALL WIRING



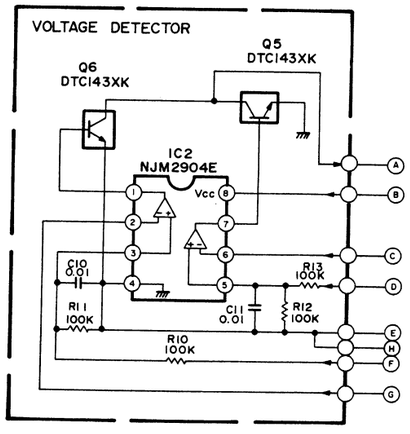
NO.	PWB NAME
31	E.VF(2)
30	E.VF(1)
29	PAL SUB
28	REGULATOR
27	TRIGGER
26	CONTROL
25	
24	EE & IND
23	VIDEO
22	IMAGER(2)
21	IMAGER(1)
20	
19	
18	
17	
16	
15	
14	
13	
12	SKEW JUMP
11	FG
10	END SENSOR LED
09	END SENSOR TRANSISTOR
08	SUP REEL SENSOR
07	TU REEL SENSOR
06	COUNTER
05	MDA
04	PRE AMP
03	OPERATION
02	Y/C
01	MAIN

4-29

4.17 MECHACON AND REGULATOR SCHEMATIC DIAGRAM



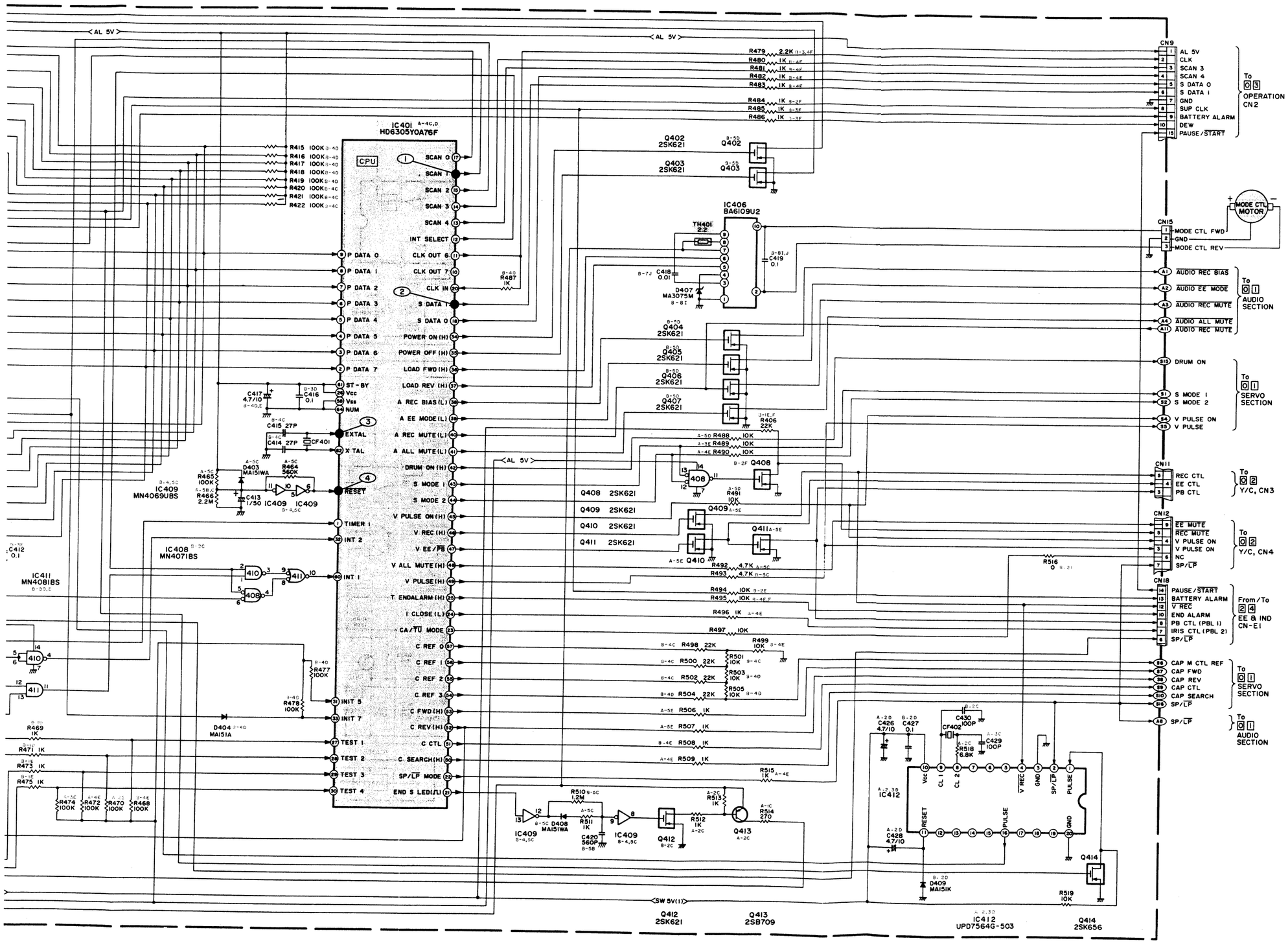
– VOLTAGE DETECTOR –



NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4-31



— Waveforms of mechacon circuit —

1

IC401-16 pin
STOP
4.86 Vp-p

2

IC401-19 pin
STOP
4.95 Vp-p

3

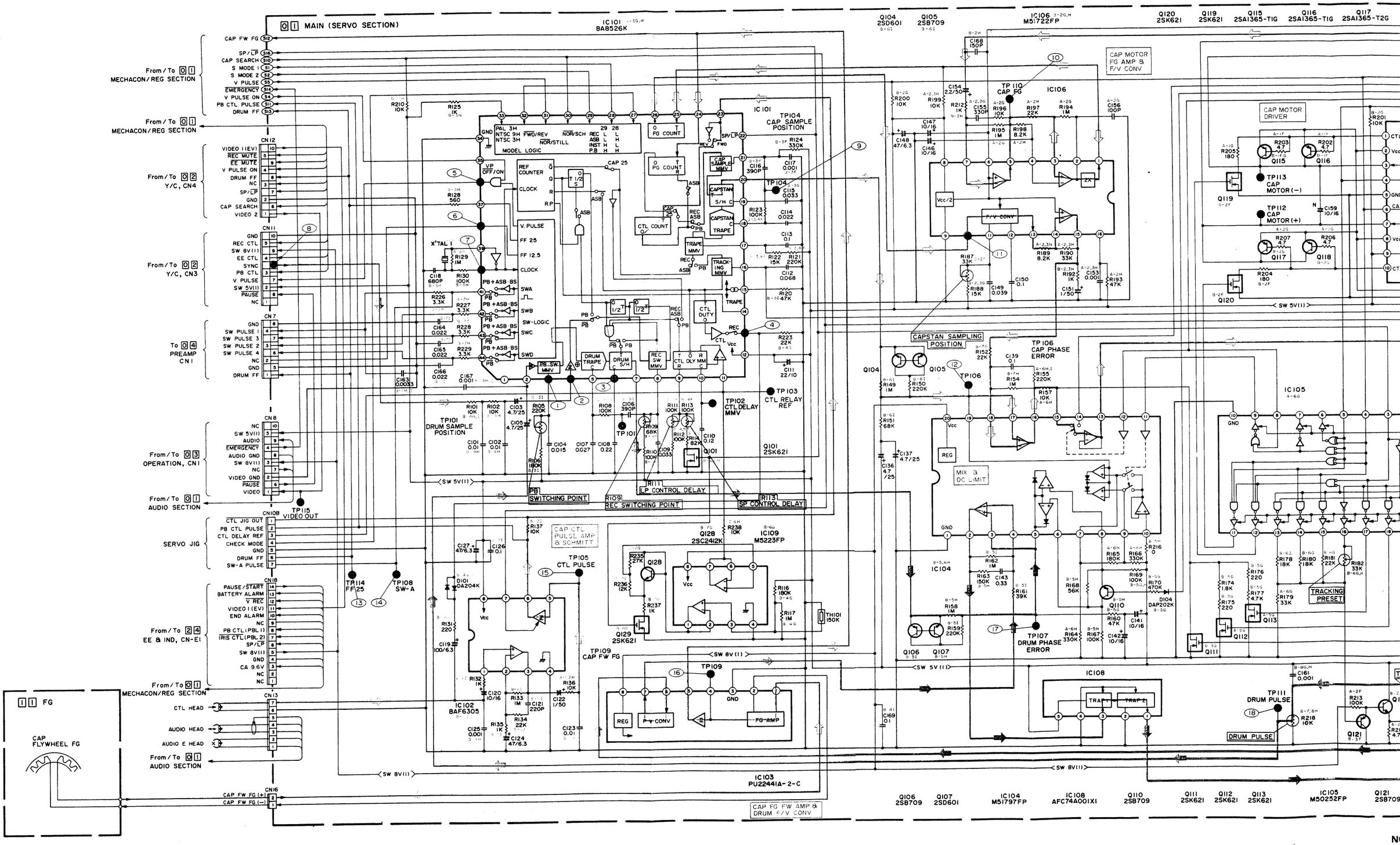
IC401-63 pin
STOP
3.4 Vp-p

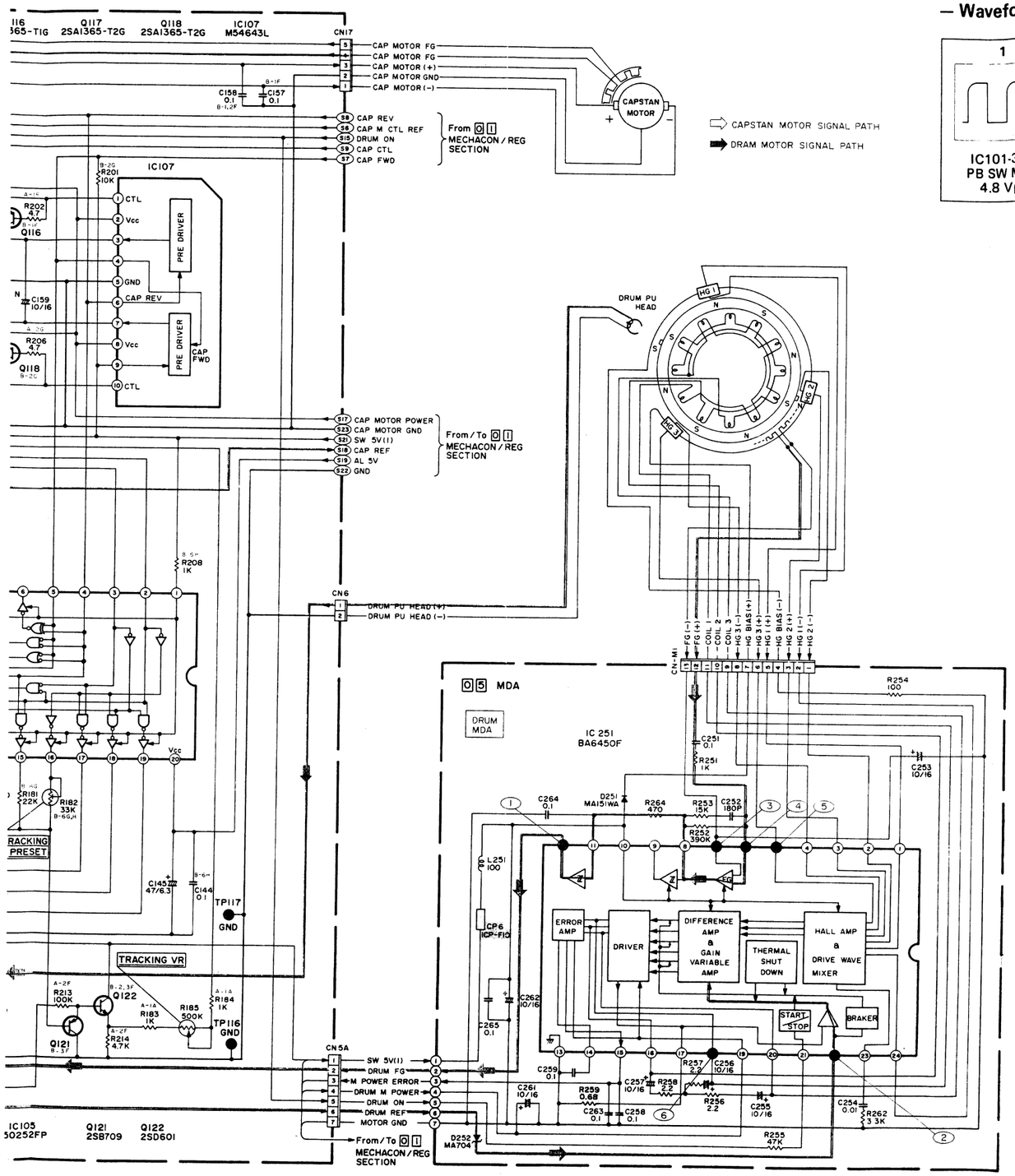
4

IC401-59 pin
MAIN POWER ON
ⓐ 5 Vp-p

4-31

4.18 SERVO & MDA SCHEMATIC DIAGRAMS





NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

— Waveforms of servo circuit —

1 — IC101-3 pin, PB SW MMV, 4.8 Vp-p

2 — IC101-4 pin, SYNC IN, 1 Vp-p

3 — IC101-6 pin, SP REC, 2.5 V DC

4 — IC101-13 pin, SP REC, 4.3 Vp-p

5 — IC101-36 pin, V. PULSE, 4.7 Vp-p

6 — IC101-38 pin, FF12.5, 4.7 Vp-p

7 — IC101-40 pin, X'TAL, 32.768 kHz, 3.35 Vp-p

8 — CN11-8 pin, SYNC, 4.7 Vp-p

9 — TP104, CAP SAMPLE, 5 Vp-p

10 — TP110 (SP REC), CAP FG, 3 Vp-p

TP110 (LP REC), CAP FG, 2.45 Vp-p

11 — IC106-10 pin (SP REC), CAP SAMPLE, 5 Vp-p

IC106-10 pin (LP REC), CAP SAMPLE, 5 Vp-p

12 — TP106, CAP PHASE ERROR, 2.35 V DC

13 — TP114, FF25, 4.2 Vp-p

14 — TP108, SW-A PULSE, 4.46 Vp-p

15 — TP105(REC), CTL PULSE, 2.4 Vp-p

TP105(PB), CTL PULSE, 2.4 Vp-p

16 — TP109 (SP REC), CAP FW FG, 2.6 Vp-p

TP109 (LP REC), CAP FW FG, 2.3 Vp-p

17 — TP107, DRUM PHASE ERROR, 2.5 V DC

18 — TP111, DRUM PULSE, 0.7 Vp-p

— Waveforms of MDA circuit —

1 — IC251-12 pin, DRUM FG, 4.3 Vp-p

2 — IC251-22 pin, DRUM REF, 1.4 V DC

3 — IC251-7 pin, FG (–), 1.98 V DC

4 — IC251-6, FG (+), (SP REC), 31 mVp-p

IC251-6 pin, FG (+), (LP REC), 1.98 V DC

5 — IC251-5 pin, HG 3 (+), 3.95 V DC

6 — IC251-18 pin, DRUM COIL 1, 5.8 Vp-p

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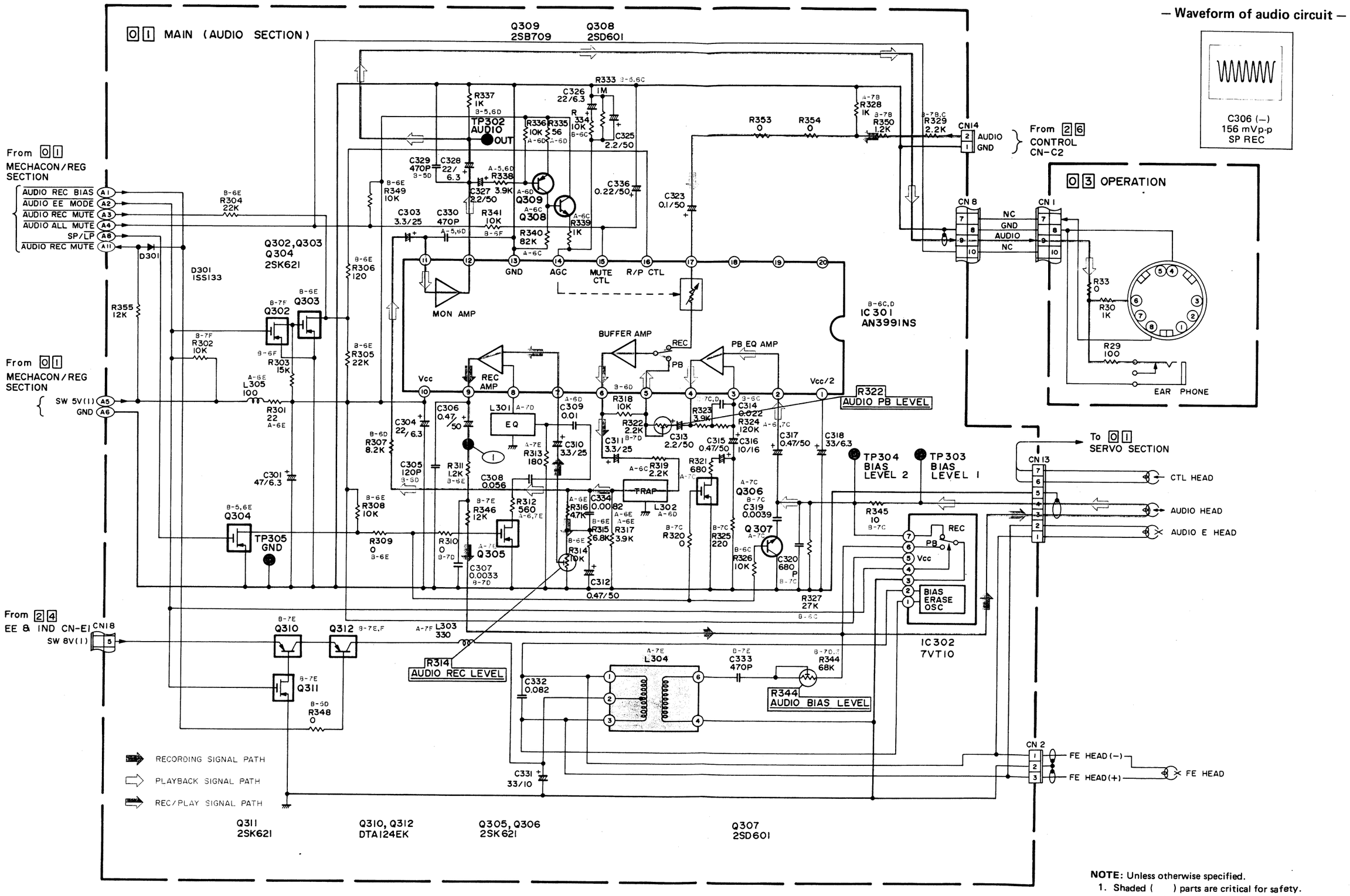
4.19 AUDIO SCHEMATIC DIAGRAM

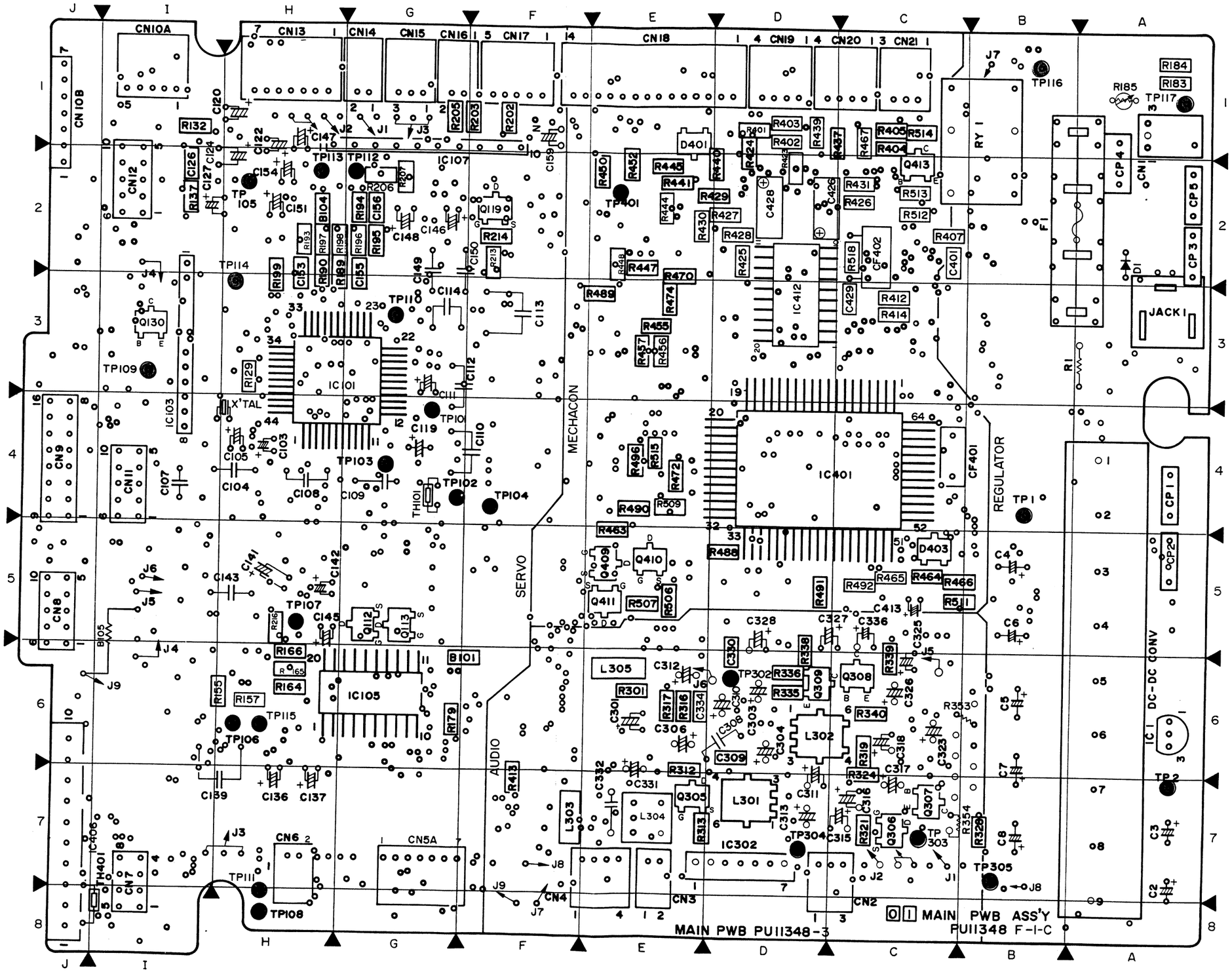


NOTE: Unless otherwise specified.
1. Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

4-33

4.20 MAIN CIRCUIT BOARD

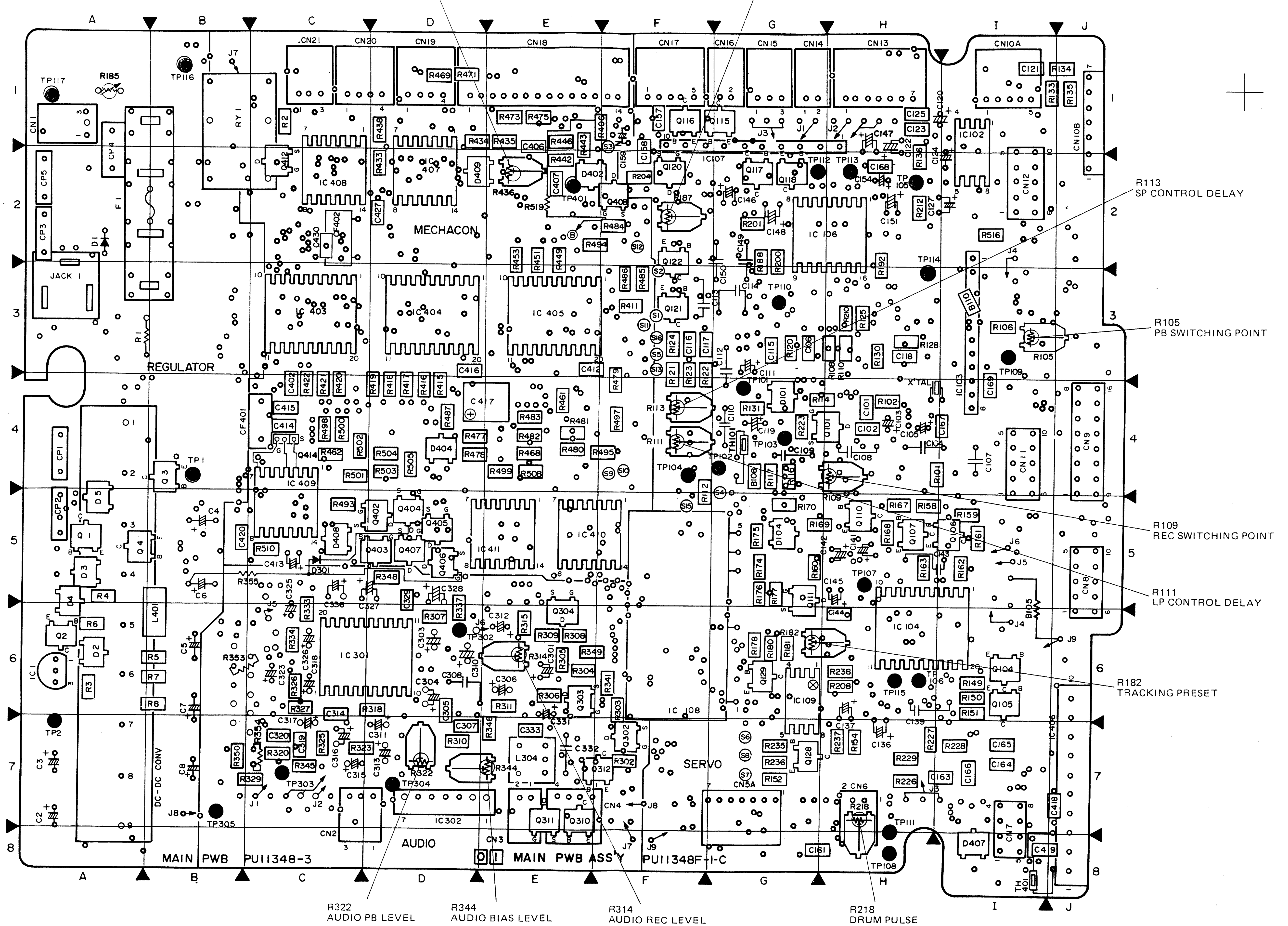
— Front side —



4-34

Note: S12 on the circuit board refers to the data line between the Mechacon CPU and the other circuits of the Main circuit board. Perform service with reference to the positions indicated in the Servo Circuit Wiring Diagram.

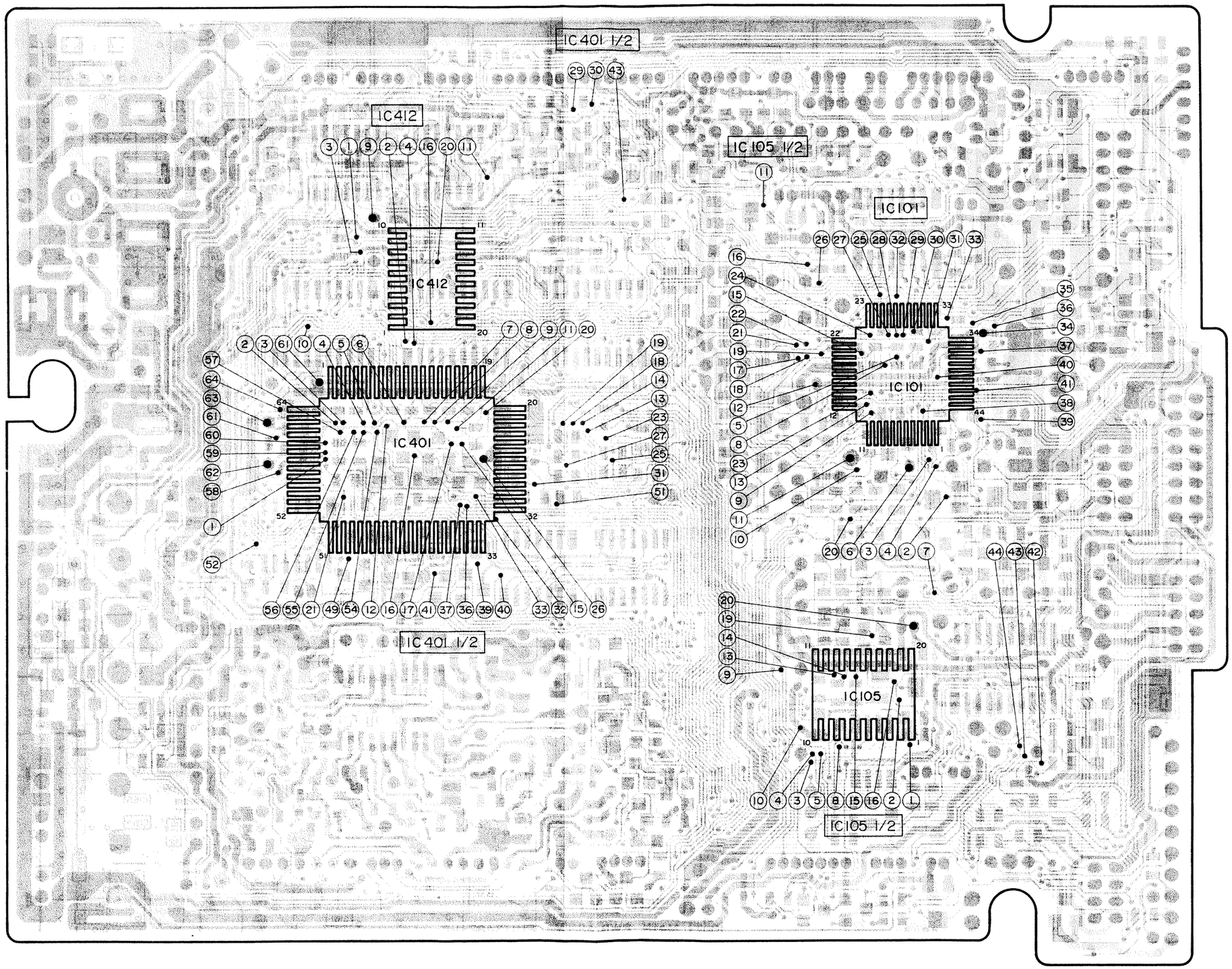
— Rear side —



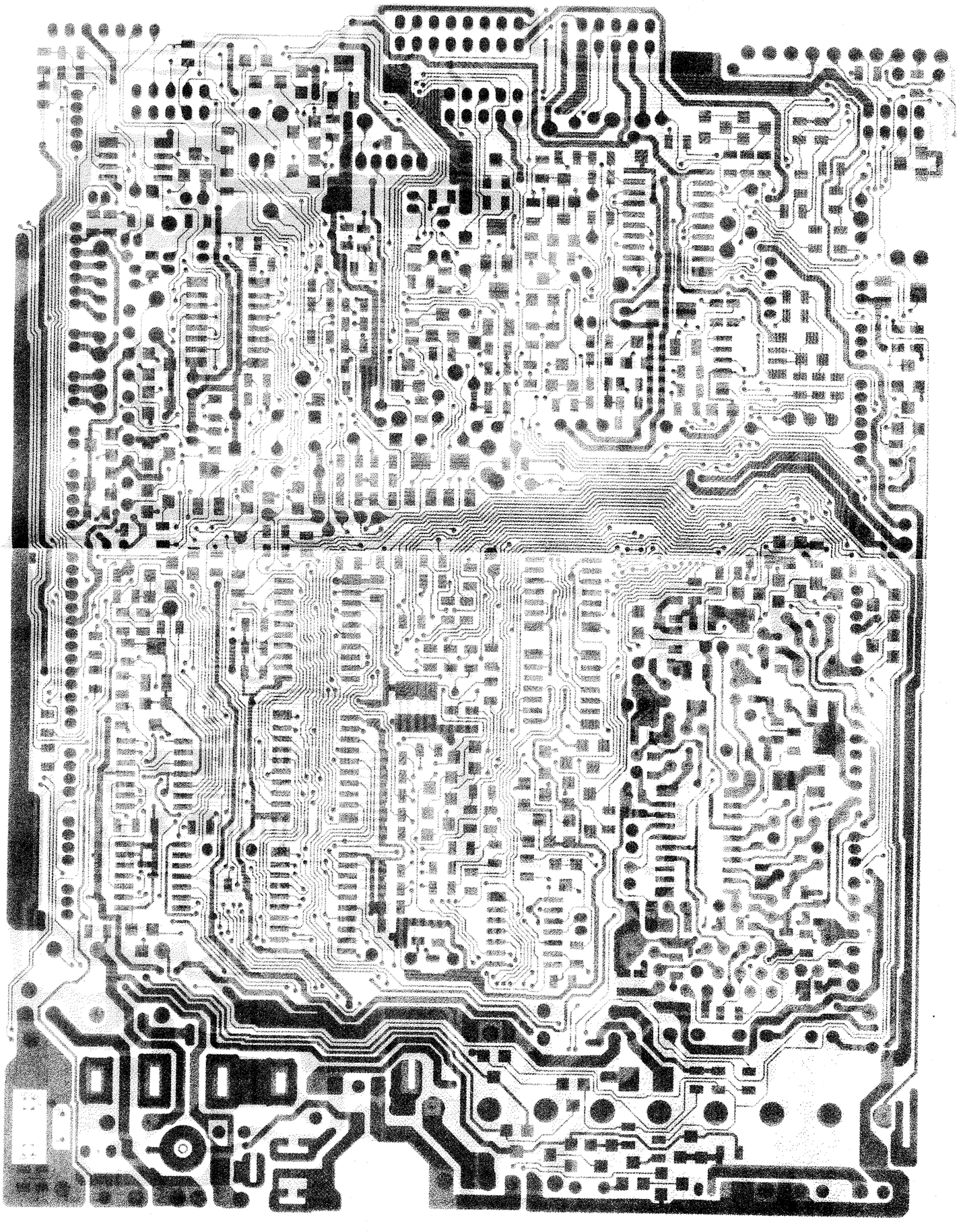
4-35

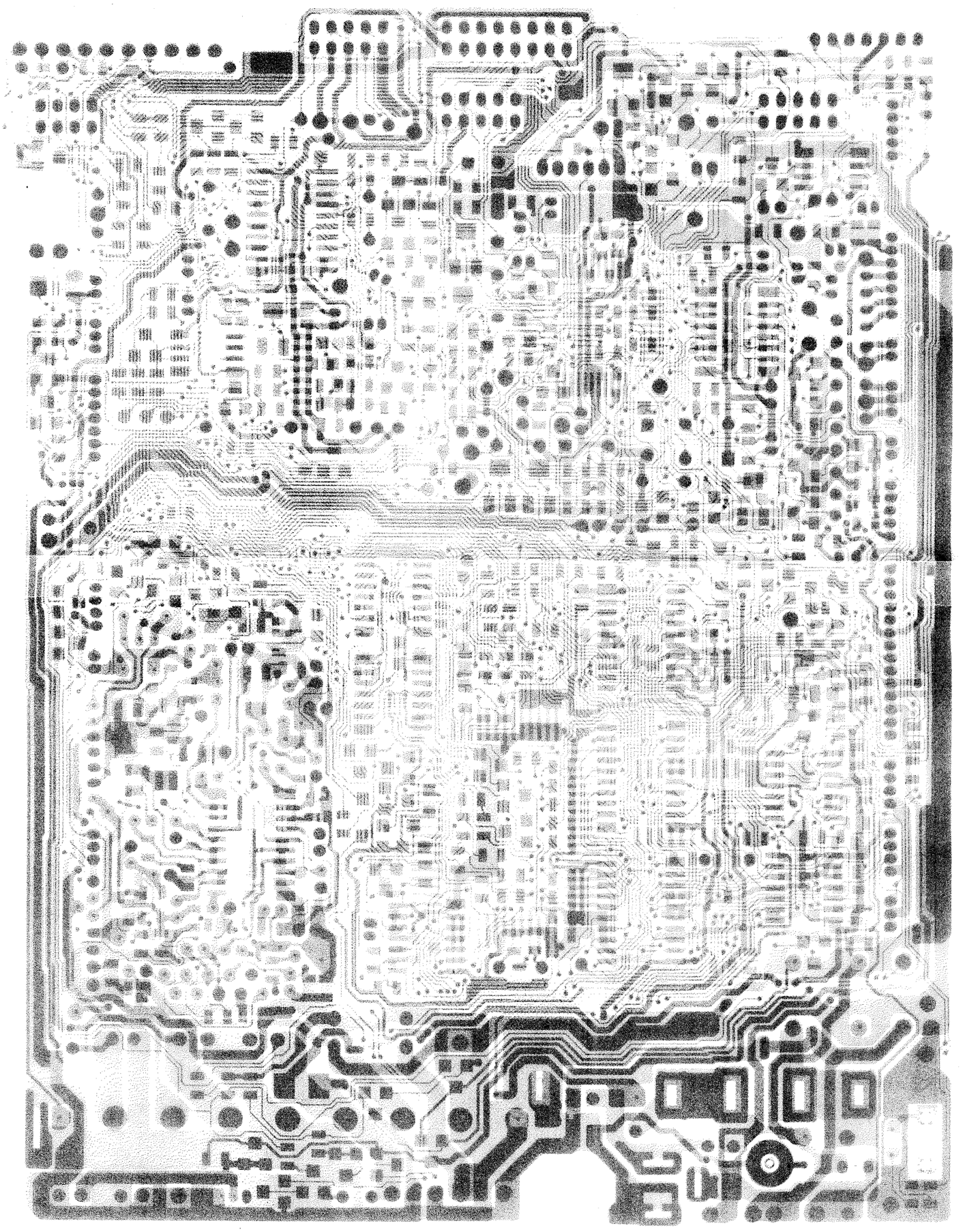
4.21 MAIN BOARD THROUGH HOLE LOCATION

Notes: 1. Number show pin numbers of IC's.
2. Use for checking IC's.

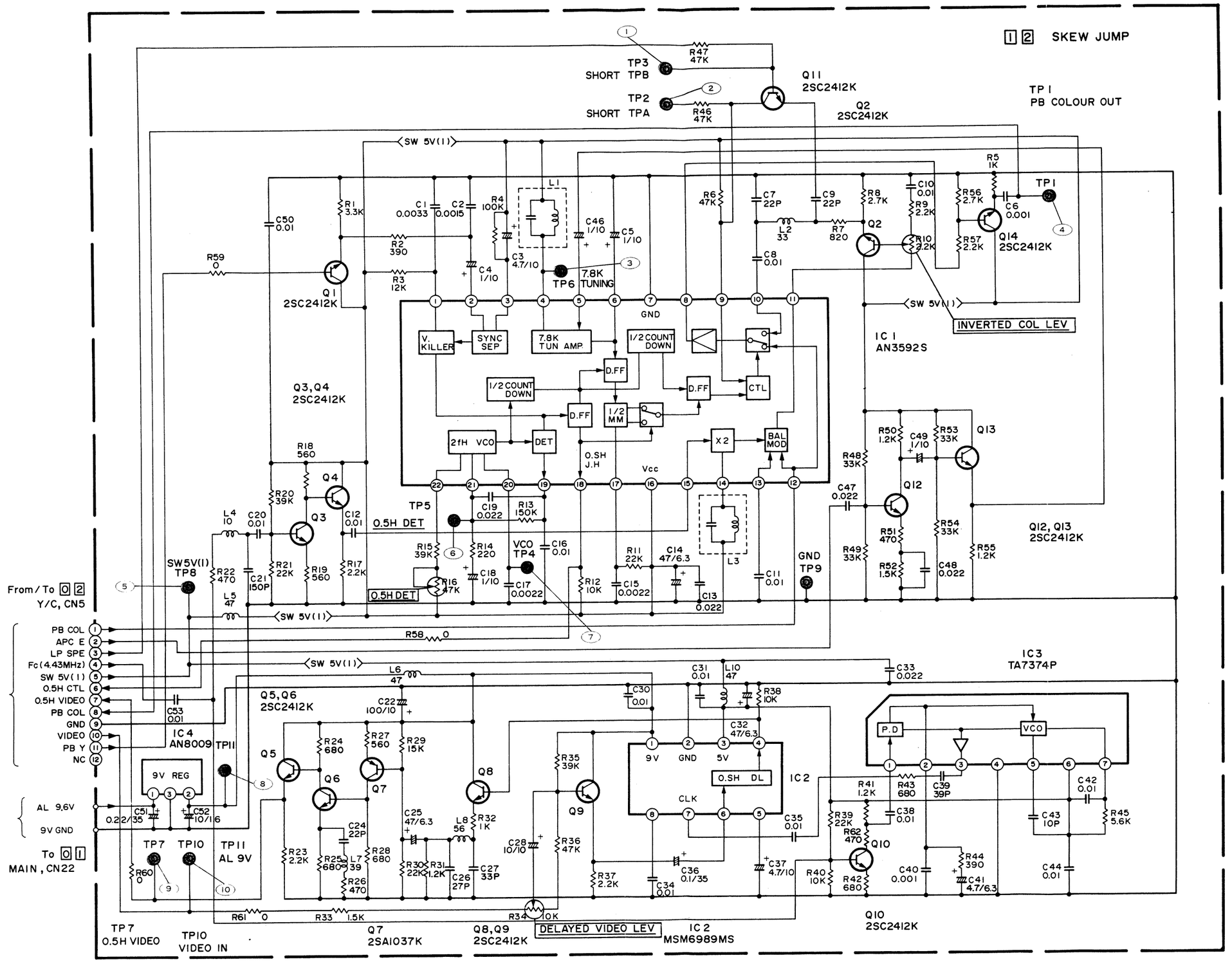


4-36





4.25 SKEW JUMP SCHEMATIC DIAGRAM



4-38

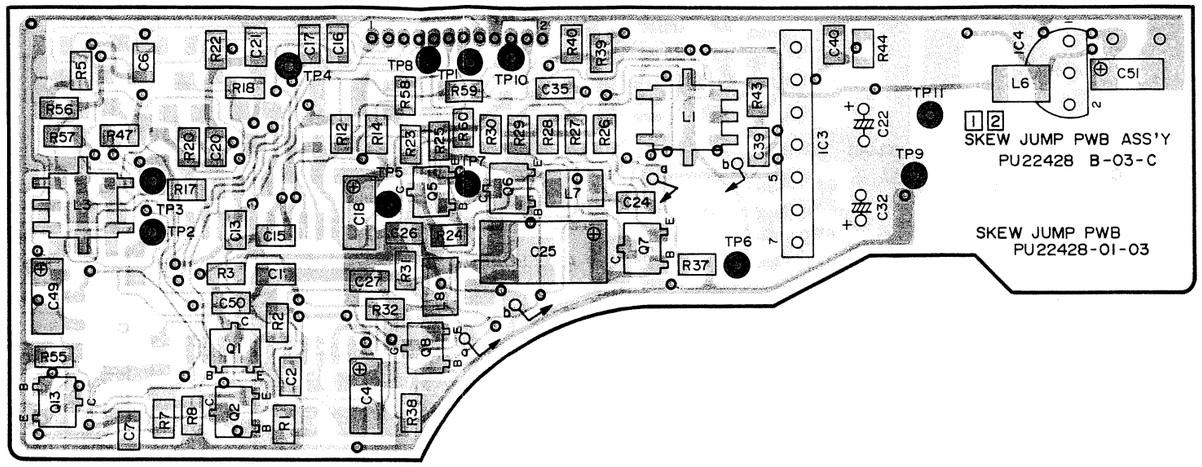
4.26 SKEW JUMP AND VOLTAGE DETECTOR CIRCUIT BOARDS

— Waveform of skew jump circuit —

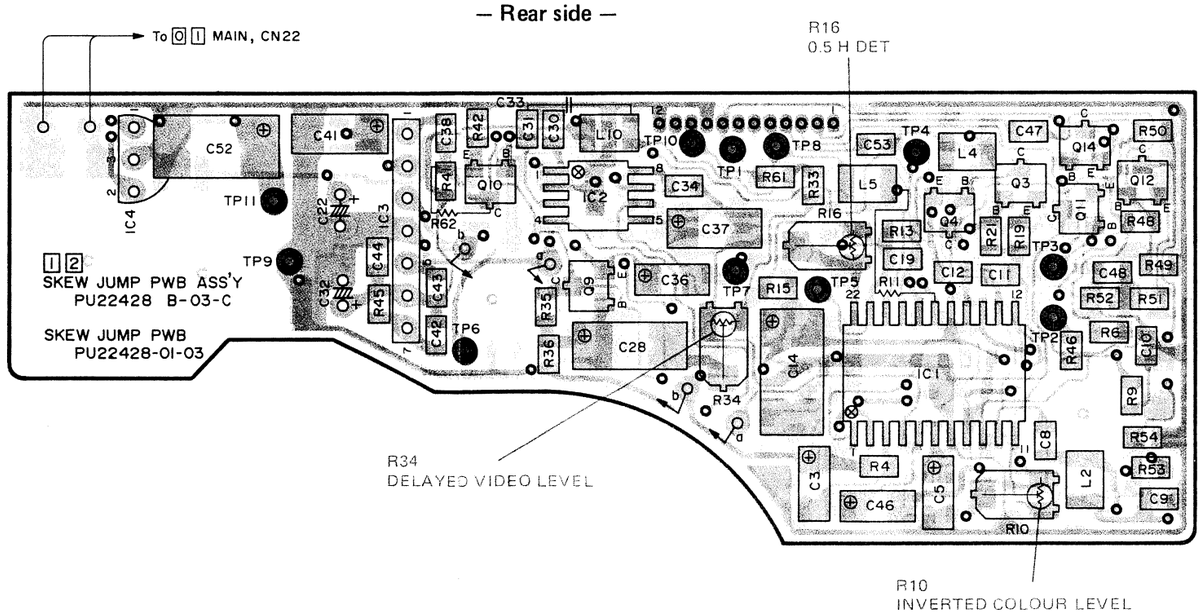
1	2
TP3 SHORT TP B NORMAL:0.6 VDC SEARCH: 0 V	TP2 SHORT TPA FF, REW, SEARCH 4.8 V DC
3	4
TP6 7.8 K TUNING 5 V DC	TP1 PB COLOR OUT 0.4 Vp-p
5	6
TP8 SW 5 V (1) 5 V DC	TP5 0.5 M DET 2.5 V DC
7	8
TP4 VCO 2.5 Vp-p	TP11 AL 9 V 9 V DC
9	10
TP7 0.5 H VIDEO 1.1 Vp-p	TP10 VIDEO IN 1.1 Vp-p

— SKEW JUMP —

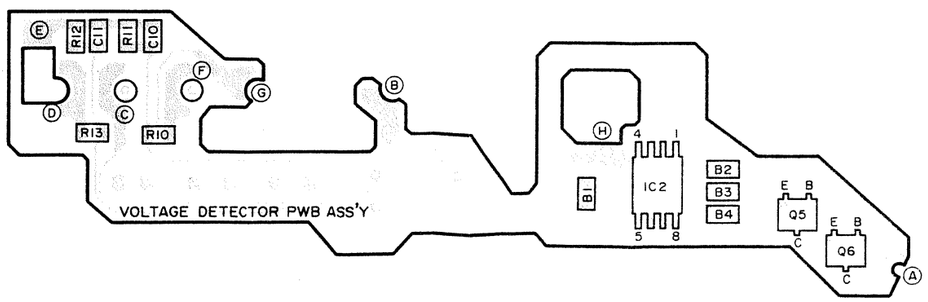
— Front side —



— Rear side —



— VOLTAGE DETECTOR —

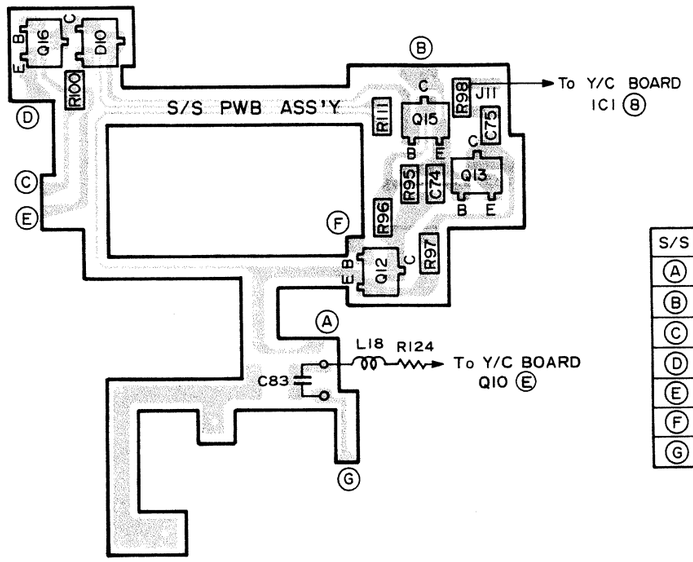


VOL. DET.	MAIN
A	RY1 (6)
B	DC-DC CONV (4)
C	DC-DC CONV (8)
D	DC-DC CONV (9)
E	DC-DC CONV SHIELD CASE (GND)
F	DC-DC CONV (7)
G	DC-DC CONV (6)
H	DC-DC CONV SHIELD CASE (GND)

4-38

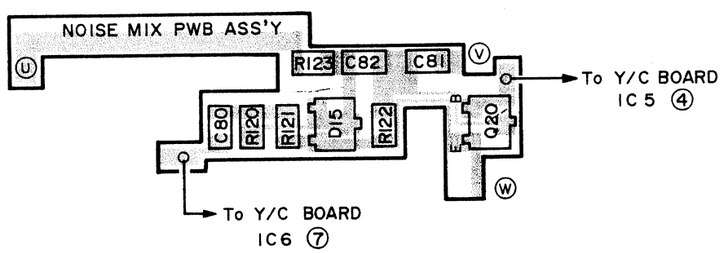
4.28 S/S AND NOISE MIX CIRCUIT BOARDS

– S/S –



S/S	Y/C
(A)	L2
(B)	C40(–)
(C)	IC5 (5)
(D)	IC5 (1)
(E)	IC5 (6)
(F)	IC3 (28)
(G)	R87

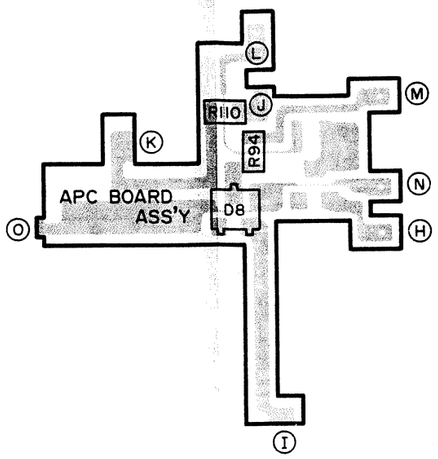
– NOISE MIX –



N. MIX	Y/C
(U)	IC 10 (11)
(V)	L8
(W)	R51

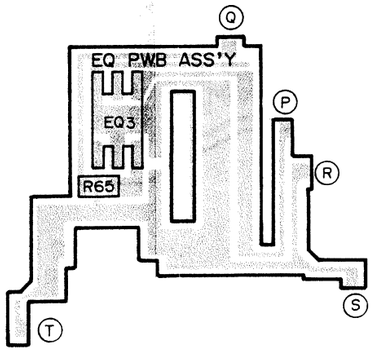
4.29 APC AND EQ CIRCUIT BOARDS

– APC –



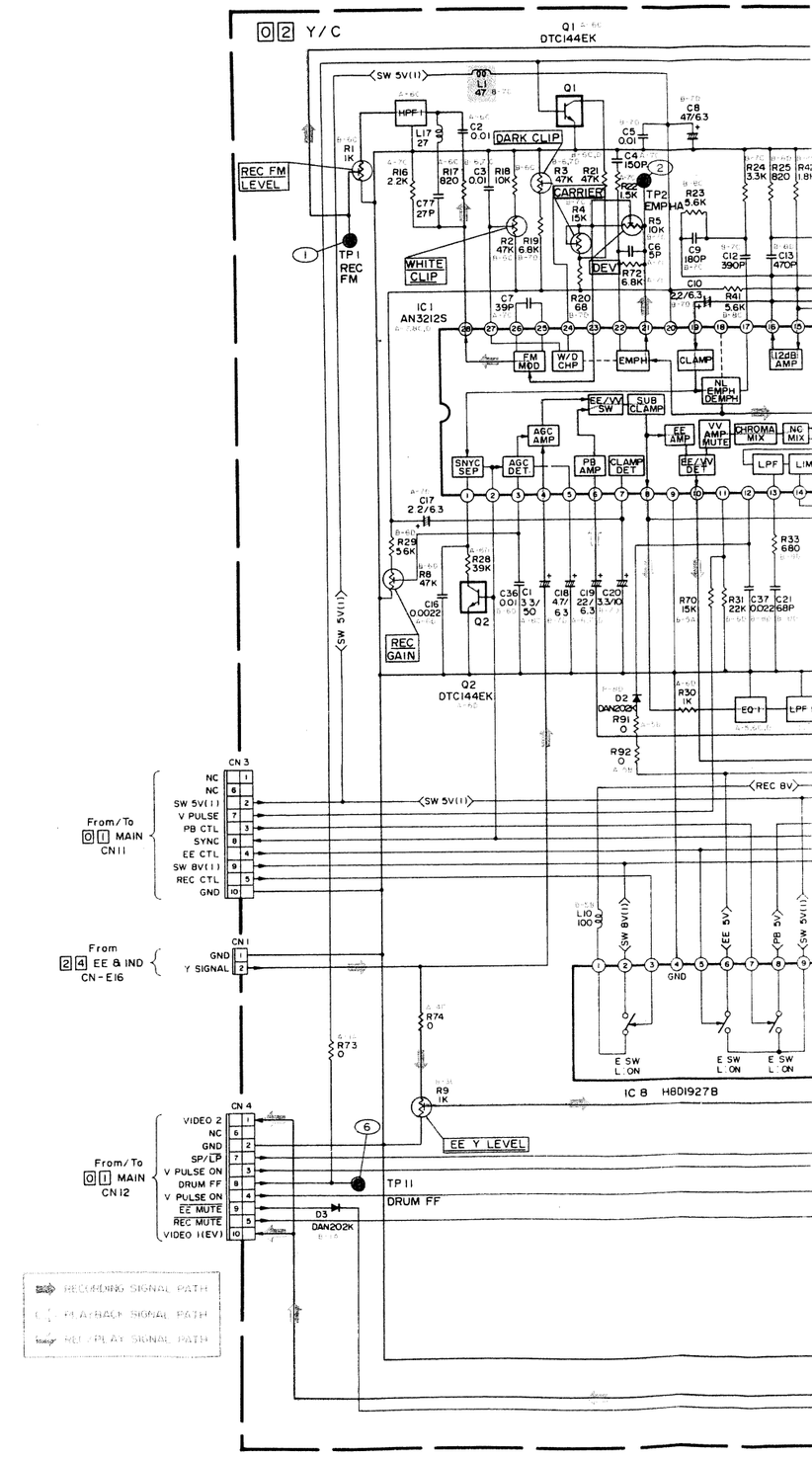
APC	Y/C
(H)	IC5 (9)
(I)	R47/R48
(J)	R89
(K)	L14
(L)	IC10 (29)
(M)	IC5 (3)
(N)	IC5 (7)
(O)	D4 (A)

– EQ –

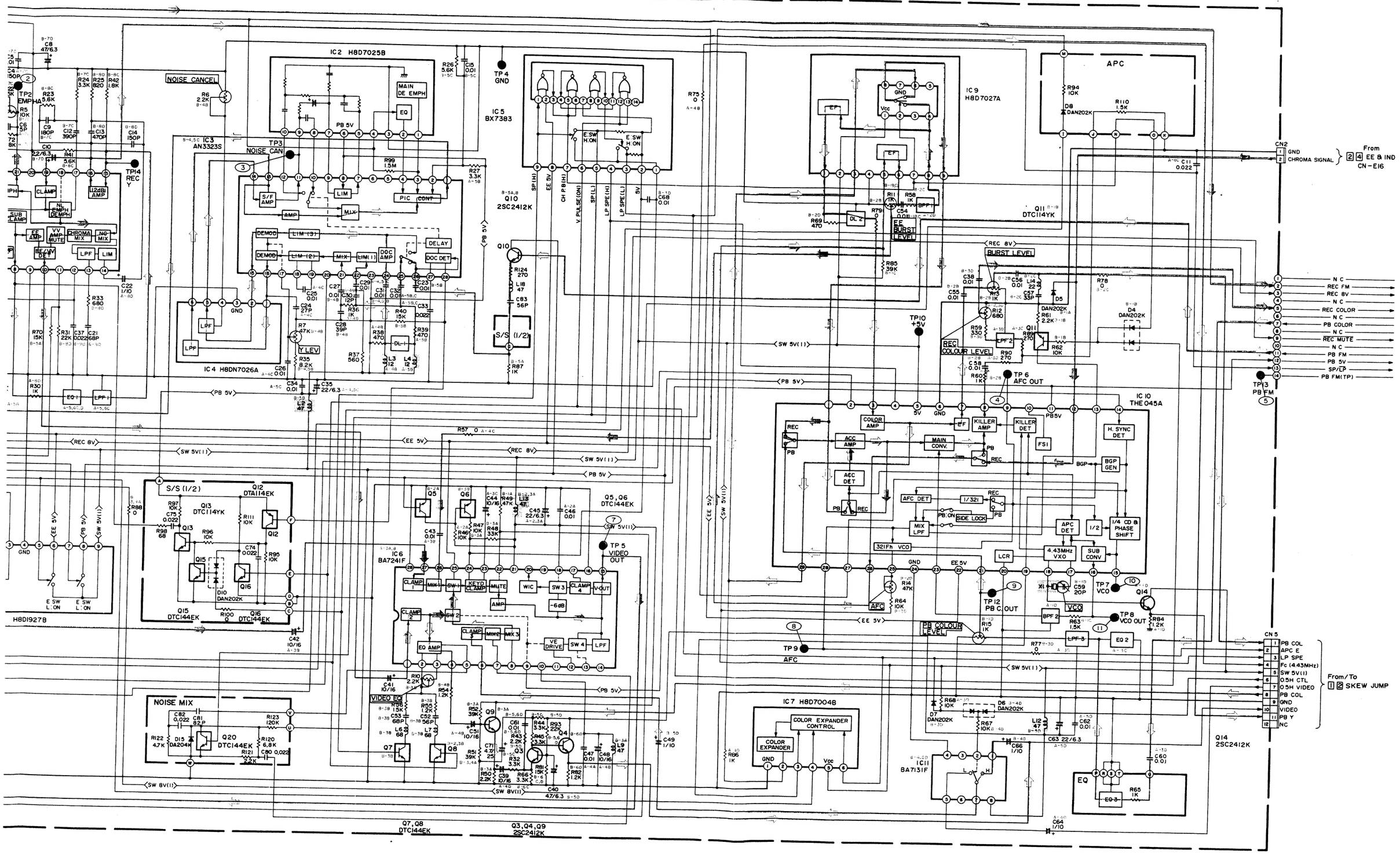


EQ	Y/C
(P)	EQ2/LPF3
(Q)	R65/C60
(R)	C44(–)
(S)	IC6 (28)
(T)	C51(–)

4.30 Y/C, PREAMP AND RF EQ SCHEMATIC DIAGRAMS



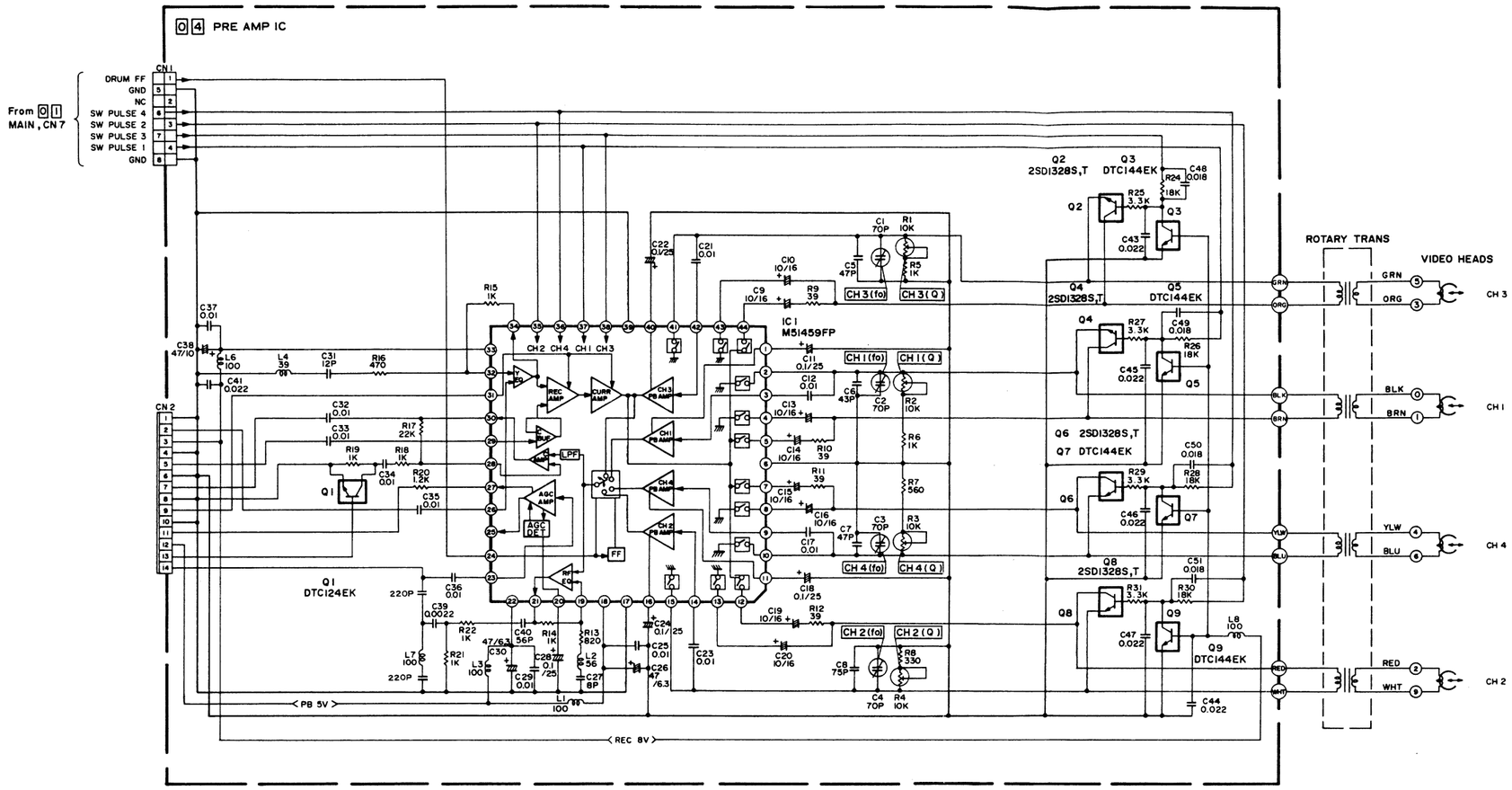
4-40



NOTE: Unless otherwise specified.

1. Shaded ( ) parts are critical for safety.
   Replace only with specified part numbers.

4-40



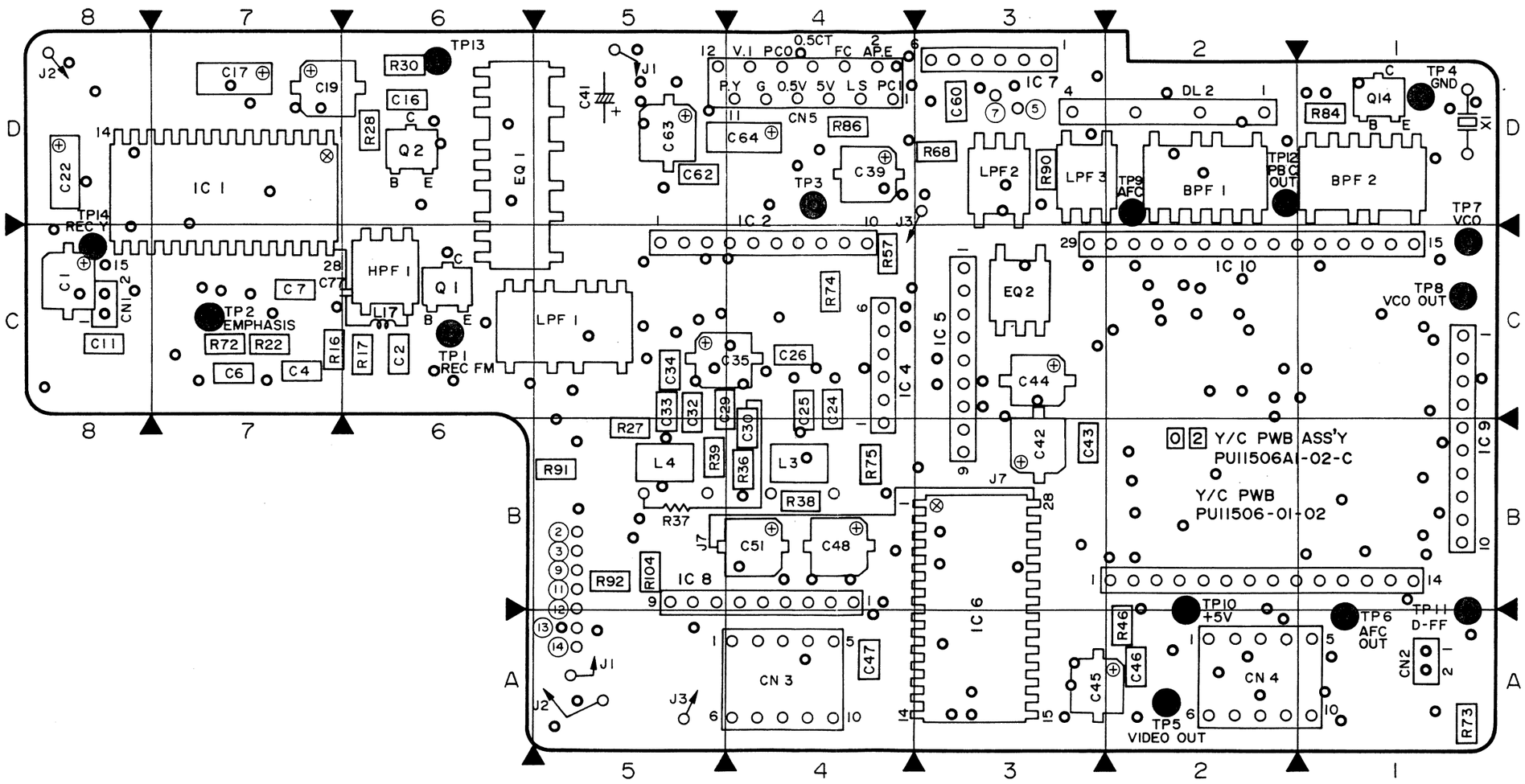
— Waveforms of Y/C circuit —

1 TP1 REC FM 160 mVp-p	2 TP2 EMPHASIS 0.76 Vp-p
3 TP3 NOISE CANCEL SP REC	4 TP6 AFC 0.7 Vp-p 5.15 MHz
5 TP13 PB FM 0.18 Vp-p	6 TP11 DRUM FF 4 Vp-p
7 TP5 VIDEO OUT 1.8 Vp-p	8 TP9 AFC ERROR 2.5 V DC
9 TP12 PB COLOR 0.2 Vp-p	10 0.6 Vp-p 3.6 VDC TP7 1/4 CD & PHASE SHIFT 0.6 Vp-p
	11 TP8 VCO OUT 0.9 Vp-p

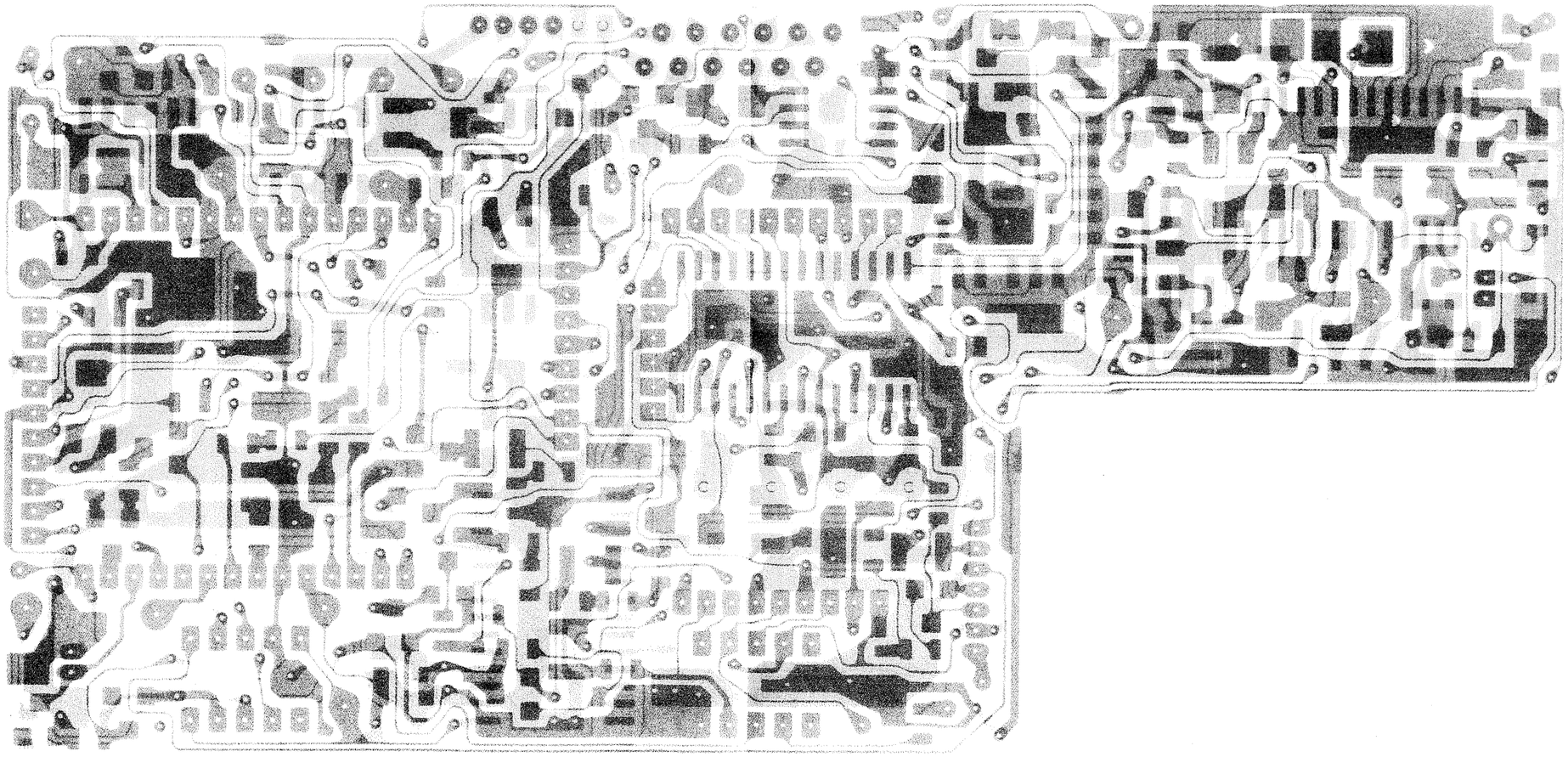
4-41

4.31 Y/C CIRCUIT BOARD

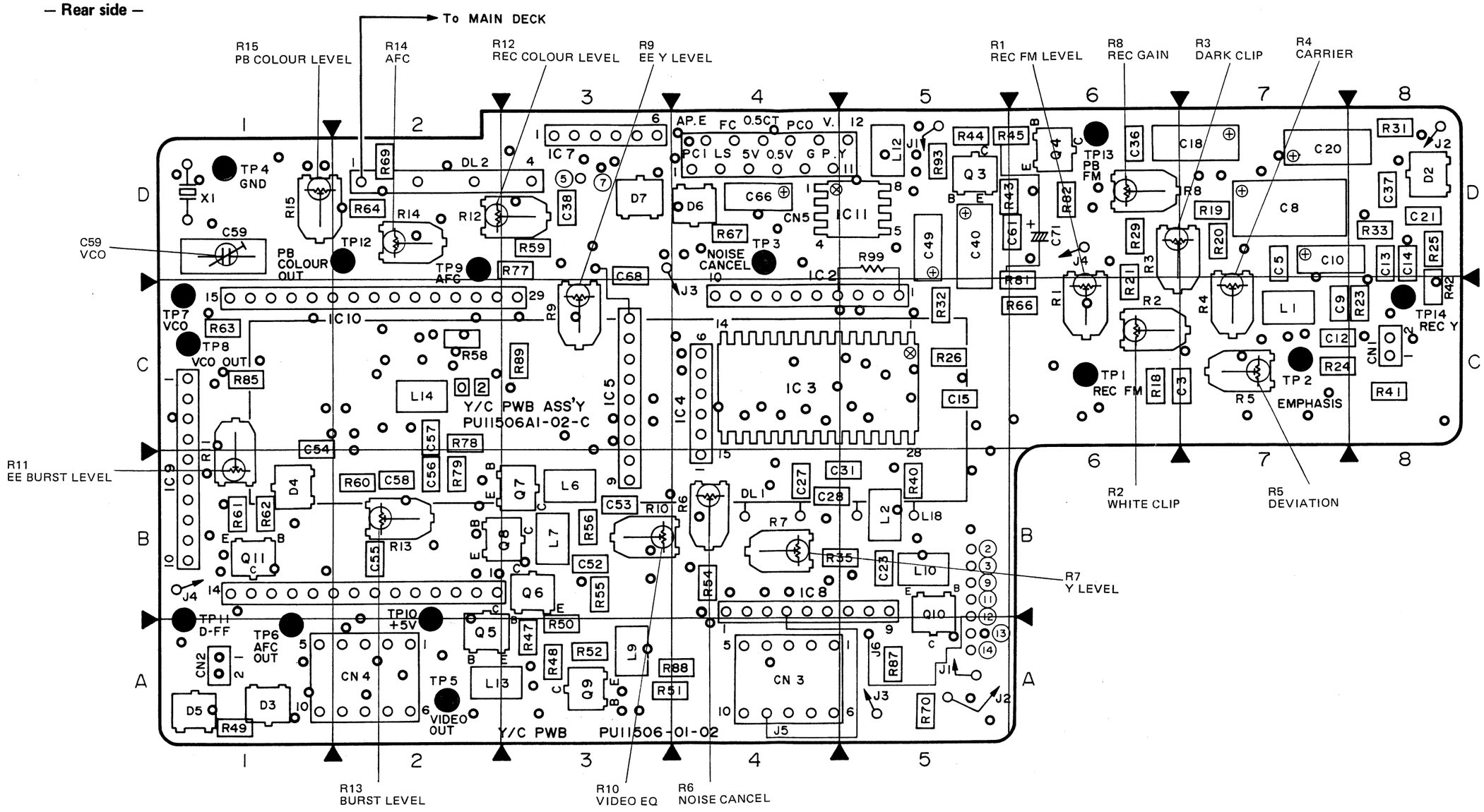
— Front side —



4-42



— Rear side —



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SECTION 6
PARTS LIST

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		PU11348F-1-C	MAIN BOARD ASS'Y [01]
		– REGULATOR SECTION –	
⚠	IC1	S-81250AG	INTEGRATED CIRCUIT
	Q1	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	Q2	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	Q3	2SD601	CHIP TRANSISTOR
	Q4	2SD601	CHIP TRANSISTOR
	D1	ERA81-004	DIODE
	D2	RD3.9M-T18	CHIP ZENER DIODE
	D3	RD5.6M-T2B	CHIP ZENER DIODE
	D4	MA151WK	CHIP DIODE
	OR	DAN202K	CHIP DIODE
	D5	MA151WK	CHIP DIODE
	OR	DAN202K	CHIP DIODE
	R1	QRD167J-683	CR
	R2	QRSA08J-684YN	CHIP R
	R3	QRSA08J-100YN	CHIP R
	R4	QRSA08J-121YN	CHIP R
	R5	QRSA08J-271YN	CHIP R
	R6	QRSA08J-102YN	CHIP R
	R7	QRSA08J-102YN	CHIP R
	R8	QRSA08J-125YN	CHIP R
	C1	–	–
	C2	QEK41CM-476	E CAP
	C3	QEK41CM-476	E CAP
	C4	QED41CM-476	E CAP
	C5	QED41CM-476	E CAP
	C6	QED41AM-826	E CAP
	C7	QED41AM-826	E CAP
	C8	QEMA1AM-107	E CAP
⚠	RY1	PU56400-2	RELAY
	JACK1	PU57179	DC JACK

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
⚠	F1	QMF51E2-3R15	FUSE (NOT INCL. IN MAIN BOARD ASS'Y)
⚠	FC1	PU57505	FUSE CLIP, FOR F1, X2
⚠	CP1	ICP-F15	CIRCUIT PROTECTOR
⚠	CP2	ICP-F20	CIRCUIT PROTECTOR
⚠	CP3	ICP-F20	CIRCUIT PROTECTOR
⚠	CP4	ICP-F15	CIRCUIT PROTECTOR
⚠	CP5	ICP-F20	CIRCUIT PROTECTOR
	TP	PU56278	TEST PIN, TP1, 2
⚠	DC CONV	PU58603-2-1	DC-DC CONVERTER
		–	VOL. DET BOARD ASS'Y (INCLUDED IN MAIN BOARD ASS'Y)
	IC2	NJM2904E	INTEGRATED CIRCUIT
	Q5	DTC143XK	CHIP DIGITAL TRANSISTOR
	Q6	DTC143XK	CHIP DIGITAL TRANSISTOR
	R10	QRSA08J-104YN	CHIP R
	R11	QRSA08J-104YN	CHIP R
	R12	QRSA08J-104YN	CHIP R
	R13	QRSA08J-104YN	CHIP R
	B1	QRSA08J-0R0Y	CHIP R
	B2	QRSA08J-0R0Y	CHIP R
	B3	QRSA08J-0R0Y	CHIP R
	B4	QRSA08J-0R0Y	CHIP R
	C10	QCYA1HK-103	CHIP CAP
	C11	QCYA1HK-103	CHIP CAP
		– SERVO SECTION –	
	IC101	BA8526K	FLAT IC
	OR	BA8527K	FLAT IC
	IC102	BAF6305	FLAT IC
	IC103	PU22441A-2-C	F/V MOD. (JC001)
	IC104	M51797FP	FLAT IC
	IC105	M50252FP	FLAT IC
	IC106	M51722FP	FLAT IC
	IC107	M54643L	INTEGRATED CIRCUIT
	IC108	AFC74A001X1	INTEGRATED CIRCUIT
	IC109	M5223FP	FLAT IC
	OR	UPC1251G	FLAT IC

#⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	Q101	2SK621	CHIP DIGITAL FET
	Q102	–	–
	Q103	–	–
	Q104	2SD601	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	Q105	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q106	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q107	2SD601	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	Q108	–	–
	Q109	–	–
	Q110	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q111	2SK621	CHIP DIGITAL FET
	Q112	2SK621	CHIP DIGITAL FET
	Q113	2SK621	CHIP DIGITAL FET
	Q114	–	–
	Q115	2SA1365-T1G	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	OR	2SA1036K(R)	CHIP TRANSISTOR
	OR	2SB624-T1BBV5	CHIP TRANSISTOR
	Q116	2SA1365-T1G	CHIP TRANSISTOR
	OR	2SA1036K(R)	CHIP TRANSISTOR
	OR	2SB624-T1BBV5	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	Q117	2SA1365-T2G	CHIP TRANSISTOR
	OR	2SA1036K(R)	CHIP TRANSISTOR
	OR	2SB624-T2BBV5	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	Q118	2SA1365-T2G	CHIP TRANSISTOR
	OR	2SA1036K(R)	CHIP TRANSISTOR
	OR	2SB624-T2BBV5	CHIP TRANSISTOR
	OR	2SB710S	CHIP TRANSISTOR
	Q119	2SK621	CHIP DIGITAL FET
	Q120	2SK621	CHIP DIGITAL FET
	Q121	2SB709	CHIP TRANSISTOR
	OR	2SA1037K	CHIP TRANSISTOR
	Q122	2SD601	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	Q128	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q129	2SK621	CHIP DIGITAL FET
	D101	DA204K	CHIP DIODE
	D102	–	–
	D103	–	–
	D104	DAP202K	CHIP DIODE
	R101	QRSA08J-103YN	CHIP R
	R102	QRSA08J-103YN	CHIP R
	R103	–	–
	R104	–	–

#⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	R105	PU59237-224	CHIP VR, PB SW POINT
	OR	PU57816-2-224	CHIP VR
	OR	QVZ3606-224	CHIP VR
	OR	PU59456-224	CHIP VR
	R106	QRSA08J-563YN	CHIP R
	R107	–	–
	R108	QRSA08J-104YN	CHIP R
	R109	PU59237-683	CHIP VR, REC SW POINT
	OR	PU57816-2-683	CHIP VR
	OR	PU59456-683	CHIP VR
	R110	QRSA08J-104YN	CHIP R
	R111	PU59237-104	CHIP VR, LP CTL DELAY
	OR	PU57816-2-104	CHIP VR
	OR	PU59456-104	CHIP VR
	R112	QRSA08J-104YN	CHIP R
	R113	PU59237-104	CHIP VR, SP CTL DELAY
	OR	PU57816-2-104	CHIP VR
	OR	PU59456-104	CHIP VR
	R114	QRSA08J-823YN	CHIP R
	R115	–	–
	R116	QRSA08J-184YN	CHIP R
	R117	QRSA08J-105YN	CHIP R
	R118	–	–
	R119	–	–
	R120	QRSA08J-473YN	CHIP R
	R121	QRSA08F-224YN	CHIP R
	R122	QRSA08F-153YN	CHIP R
	R123	QRSA08J-104YN	CHIP R
	R124	QRSA08J-334YN	CHIP R
	R125	QRSA08J-102YN	CHIP R
	R126	–	–
	R127	–	–
	R128	QRSA08J-561YN	CHIP R
	R129	QRSA08J-105YN	CHIP R
	R130	QRSA08J-104YN	CHIP R
	R131	QRSA08J-221YN	CHIP R
	R132	QRSA08J-102YN	CHIP R
	R133	QRSA08J-105YN	CHIP R
	R134	QRSA08J-223YN	CHIP R
	R135	QRSA08J-102YN	CHIP R
	R136	QRSA08J-103YN	CHIP R
	R137	QRSA08J-103YN	CHIP R
	R138	–	–
	R139	–	–
	R140	–	–
	R141	–	–
	R142	–	–
	R143	–	–
	R144	–	–
	R145	–	–
	R146	–	–
	R147	–	–
	R148	–	–
	R149	QRSA08J-105YN	CHIP R
	R150	QRSA08J-224YN	CHIP R
	R151	QRSA08J-683YN	CHIP R
	R152	QRSA08J-223YN	CHIP R
	R153	–	–
	R154	QRSA08J-105YN	CHIP R
	R155	QRSA08J-224YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R156	–	–
	R157	QRSA08J-103YN	CHIP R
	R158	QRSA08J-105YN	CHIP R
	R159	QRSA08J-224YN	CHIP R
	R160	QRSA08J-473YN	CHIP R
	R161	QRSA08J-393YN	CHIP R
	R162	QRSA08J-105YN	CHIP R
	R163	QRSA08J-154YN	CHIP R
	R164	QRSA08J-334YN	CHIP R
	R165	QRSA08J-184YN	CHIP R
	R166	QRSA08J-334YN	CHIP R
	R167	QRSA08J-104YN	CHIP R
	R168	QRSA08J-563YN	CHIP R
	R169	QRSA08J-104YN	CHIP R
	R170	QRSA08J-474YN	CHIP R
	R171	–	–
	R172	–	–
	R173	–	–
	R174	QRSA08J-182YN	CHIP R
	R175	QRSA08J-221YN	CHIP R
	R176	QRSA08J-221YN	CHIP R
	R177	QRSA08J-472YN	CHIP R
	R178	QRSA08J-183YN	CHIP R
	R179	QRSA08J-333YN	CHIP R
	R180	QRSA08J-183YN	CHIP R
	R181	QRSA08J-223YN	CHIP R
	R182	QVZ3606-333	CHIP VR, TRACKING PRESET
	R183	QRSA08J-102YN	CHIP R
	R184	QRSA08J-102YN	CHIP R
	R185	PU56399-4	VR, TRACKING VR, 500 K
	R186	–	–
	R187	PU59237-333	CHIP VR, CAP. SAMPLING
	OR	PU57816-2-333	CHIP VR
	OR	PU59456-333	CHIP VR
	R188	QRSA08J-153YN	CHIP R
	R189	QRSA08J-822YN	CHIP R
	R190	QRSA08J-333YN	CHIP R
	R191	–	–
	R192	QRSA08J-102YN	CHIP R
	R193	QRSA08J-473YN	CHIP R
	R194	QRSA08J-105YN	CHIP R
	R195	QRSA08J-105YN	CHIP R
	R196	QRSA08J-103YN	CHIP R
	R197	QRSA08J-223YN	CHIP R
	R198	QRSA08J-822YN	CHIP R
	R199	QRSA08J-103YN	CHIP R
	R200	QRSA08J-103YN	CHIP R
	R201	QRSA08J-103YN	CHIP R
	R202	QRSA08K-4R7YN	CHIP R
	R203	QRSA08K-4R7YN	CHIP R
	R204	QRSA08J-181YN	CHIP R
	R205	QRSA08J-181YN	CHIP R
	R206	QRSA08K-4R7YN	CHIP R
	R207	QRSA08K-4R7YN	CHIP R
	R208	QRSA08J-102YN	CHIP R
	R209	–	–
	R210	QRSA08J-103YN	CHIP R
	R211	–	–
	R212	QRSA08J-102YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R213	QRSA08J-104YN	CHIP R
	R214	QRSA08J-472YN	CHIP R
	R215	–	–
	R216	QRSA08J-0R0Y	CHIP R
	R217	–	–
	R218	PU59237-103	CHIP VR, DRUM PULSE
	OR	PU57816-2-103	CHIP VR
	OR	PU59456-103	CHIP VR
	R219	–	–
	R220	–	–
	R221	–	–
	R222	–	–
	R223	QRSA08J-223YN	CHIP R
	R224	–	–
	R225	–	–
	R226	QRSA08J-332YN	CHIP R
	R227	QRSA08J-332YN	CHIP R
	R228	QRSA08J-332YN	CHIP R
	R229	QRSA08J-332YN	CHIP R
	R235	QRSA08J-273YN	CHIP R
	R236	QRSA08J-123YN	CHIP R
	R237	QRSA08J-102YN	CHIP R
	R238	QRSA08J-103YN	CHIP R
	TH101	ERT-D2FIK-154S	THERMISTOR
	B101	QRSA08J-0R0Y	CHIP R
	B102	–	–
	B103	–	–
	B104	QRSA08J-0R0Y	CHIP R
	B105	QRD161J-0R0	CR
	B106	–	–
	B107	–	–
	B108	QRSA08J-0R0Y	CHIP R
	B109	–	–
	B110	QRSA08J-0R0Y	CHIP R
	C101	QCYA1HK-103	CHIP CAP
	C102	QCYA1HK-103	CHIP CAP
	C103	QER41EM-475	E CAP
	C104	QFJ41HJ-153	MY CAP
	C105	QER41EM-475	E CAP
	C106	QCSA1HJ-391	CHIP CAP
	C107	QFJ41HJ-273	MY CAP
	C108	QFZ9011-224	MP CAP
	C109	PU60038-333	PP CAP
	C110	QFZ9011-124	MP CAP
	C111	QEE81AM-226	T CAP
	C112	QFJ41HJ-683	MY CAP
	C113	QFZ9011-104	MP CAP
	C114	QFJ41HJ-223	MY CAP
	C115	QCDA1EM-333	CHIP CAP
	C116	QCSA1HJ-391	CHIP CAP

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C117	QCYA1HK-102	CHIP CAP
	C118	QCSA1HJ-681	CHIP CAP
	C119	QER40JM-107	E CAP
	C120	QER41CM-106	E CAP
	C121	QCSA1HJ-221	CHIP CAP
	C122	QER41HM-105	E CAP
	C123	QCYA1HK-103	CHIP CAP
	C124	QER40JM-476	E CAP
	C125	QCYA1HK-102	CHIP CAP
	C126	QCFA1EZ-104	CHIP CAP
	C127	QER40JM-476	E CAP
	C128	–	–
	C129	–	–
	C130	–	–
	C131	–	–
	C132	–	–
	C133	–	–
	C134	–	–
	C135	–	–
	C136	QEL41EM-475E	E CAP
	C137	QEL41EM-475E	E CAP
	C138	–	–
	C139	QFZ0095-104	MP CAP
	C140	–	–
	C141	QEL41CM-106E	E CAP
	C142	QEL41CM-106E	E CAP
	C143	QFZ9011-334	MP CAP
	C144	QCFA1EZ-104	CHIP CAP
	C145	QER40JM-476	E CAP
	C146	QER41CM-106	E CAP
	C147	QER41CM-106	E CAP
	C148	QER40JM-476	E CAP
	C149	QFZ0095-393	MP CAP
	C150	QFZ0096-104	MP CAP
	OR	QFZ0095-104	MP CAP
	C151	QER41HM-105	E CAP
	C152	–	–
	C153	QCYA1HK-102	CHIP CAP
	C154	QER41HM-225	E CAP
	C155	QCSA1HJ-331	CHIP CAP
	C156	QCSA1HJ-101	CHIP CAP
	C157	QCFA1EZ-104	CHIP CAP
	C158	QCFA1EZ-104	CHIP CAP
	C159	QEPA1CM-106	NP CAP
	C160	–	–
	C161	QCYA1HK-102	CHIP CAP
	C162	–	–
	C163	QCYA1HK-332	CHIP CAP
	C164	QCYA1EK-223	CHIP CAP
	C165	QCYA1EK-223	CHIP CAP
	C166	QCYA1EK-223	CHIP CAP
	C167	QCYA1HK-102	CHIP CAP
	C168	QCSA1HJ-151	CHIP CAP
	C169	QCFA1EZ-104	CHIP CAP
⚠	X'TAL 1	PU47701	CRYSTAL
	TP	PU56278	TEST PIN, TP101–117

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	– AUDIO SECTION –		
	IC301	AN3991NS	FLAT IC
	IC302	7VT10	INTEGRATED CIRCUIT
	Q301	–	–
	Q302	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q303	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q304	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q305	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q306	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q307	2SD601	CHIP TRANSISTOR
	Q308	2SD601	CHIP TRANSISTOR
	Q309	2SB709	CHIP TRANSISTOR
	Q310	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	Q311	2SK621	CHIP DIGITAL FET
	OR	DTC144EK	CHIP DIGITAL TRANSISTOR
	OR	2SC3395	CHIP DIGITAL TRANSISTOR
	Q312	DTA124EK	CHIP DIGITAL TRANSISTOR
	OR	UN2112	CHIP DIGITAL TRANSISTOR
	D301	1SS133	DIODE
	R301	QRSA08J-220YN	CHIP R
	R302	QRSA08J-103YN	CHIP R
	R303	QRSA08J-153YN	CHIP R
	R304	QRSA08J-223YN	CHIP R
	R305	QRSA08J-223YN	CHIP R
	R306	QRSA08J-121YN	CHIP R
	R307	QRSA08J-822YN	CHIP R
	R308	QRSA08J-103YN	CHIP R
	R309	QRSA08J-0R0Y	CHIP R
	R310	QRSA08J-0R0Y	CHIP R
	R311	QRSA08J-122YN	CHIP R
	R312	QRSA08J-561YN	CHIP R
	R313	QRSA08J-181YN	CHIP R
	R314	PU59237-103	CHIP VR, AUDIO REC LEVEL
	OR	PU57816-2-103	CHIP VR
	OR	PU59456-103	CHIP VR
	R315	QRSA08J-682YN	CHIP R
	R316	QRSA08J-472YN	CHIP R
	R317	QRSA08J-392YN	CHIP R
	R318	QRSA08J-103YN	CHIP R
	R319	QRSA08J-222YN	CHIP R
	R320	QRSA08J-0R0Y	CHIP R
	R321	QRSA08J-681YN	CHIP R

#	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	R322	PU59237-222	CHIP VR, AUDIO PB LEVEL
	OR	PU57816-2-222	CHIP VR
	OR	PU59456-222	CHIP VR
	R323	QRSA08J-392YN	CHIP R
	R324	QRSA08J-124YN	CHIP R
	R325	QRSA08J-221YN	CHIP R
	R326	QRSA08J-103YN	CHIP R
	R327	QRSA08J-273YN	CHIP R
	R328	QRSA08J-102YN	CHIP R
	R329	QRSA08J-222YN	CHIP R
	R330	–	–
	R331	–	–
	R332	–	–
	R333	QRSA08J-105YN	CHIP R
	R334	QRSA08J-103YN	CHIP R
	R335	QRSA08J-560YN	CHIP R
	R336	QRSA08J-103YN	CHIP R
	R337	QRSA08J-102YN	CHIP R
	R338	QRSA08J-392YN	CHIP R
	R339	QRSA08J-102YN	CHIP R
	R340	QRSA08J-823YN	CHIP R
	R341	QRSA08J-103YN	CHIP R
	R342	–	–
	R343	–	–
	R344	QVZ3606-683	CHIP VR, AUDIO BIAS LEVEL
	R345	QRSA08J-100YN	CHIP R
	R346	QRSA08J-123YN	CHIP R
	R347	–	–
	R348	QRSA08J-0R0Y	CHIP R
	R349	QRSA08J-103YN	CHIP R
	R350	QRSA08J-122YN	CHIP R
	R351	–	–
	R352	–	–
	R353	QRD163J-0R0	CR
	R354	QRD163J-0R0	CR
	R355	QRD161J-123	CR
	C301	QER40JM-476	E CAP
	C302	–	–
	C303	QER41EM-335	E CAP
	C304	QER40JM-226	E CAP
	C305	QCSA1HJ-121	CHIP CAP
	C306	QER41HM-474	E CAP
	C307	QCYA1HK-332	CHIP CAP
	C308	QFZ9011-563	MP CAP
	C309	QCYA1HK-103	CHIP CAP
	C310	QER41EM-335	E CAP
	C311	QER41EM-335	E CAP
	C312	QER41HM-474	E CAP
	C313	QER41HM-225	E CAP
	C314	QCYA1EK-223	CHIP CAP
	C315	QER41HM-474	E CAP
	C316	QER41CM-106	E CAP
	C317	QER41HM-474	E CAP
	C318	QER40JM-336	E CAP
	C319	QCYA1HK-392	CHIP CAP
	C320	QCSA1HJ-681	CHIP CAP

#	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	C321	–	–
	C322	–	–
	C323	QER41HM-104	E CAP
	C324	–	–
	C325	QER41HM-225	E CAP
	C326	QER40JM-226	E CAP
	C327	QER41HM-225	E CAP
	C328	QER40JM-226	E CAP
	C329	QCSA1HJ-471	CHIP CAP
	C330	QCSA1HJ-471	CHIP CAP
	C331	QER41AM-336	E CAP
	C332	QFZ9011-823	MP CAP
	C333	QCSA1HJ-471	CHIP CAP
	C334	QCYA1HK-822	CHIP CAP
	C335	–	–
	C336	QER41HM-224	E CAP
	L301	PU56197-2	CHIP EQUALIZER
	L302	PU58610	CHIP TRAP COIL
	L303	PU55843-331K	CHIP COIL
⚠	L304	PU58611	OSC COIL
	L305	PU55843-101K	CHIP COIL
	TP	PU56278	TEST PIN, TP302–305
		– MECHACON SECTION –	
⚠	IC401	HD6305Y0A76F	FLAT IC
	IC402	–	–
	IC403	MN74HC244S	FLAT IC
	OR	SN74HC244NS	FLAT IC
	IC404	MN74HC244S	FLAT IC
	OR	SN74HC244NS	FLAT IC
	IC405	MN74HC244S	FLAT IC
	OR	SN74HC244NS	FLAT IC
	IC406	BA6109U2	INTEGRATED CIRCUIT
	IC407	AN6564NS	FLAT IC
	IC408	MN4071BS	FLAT IC
	IC409	MN4069UBS	FLAT IC
	IC410	MN4011BS	FLAT IC
	IC411	MN4081BS	FLAT IC
	IC412	UPD7564G-503	FLAT IC
	Q401	–	–
	Q402	2SK621	CHIP DIGITAL FET
	Q403	2SK621	CHIP DIGITAL FET
	Q404	2SK621	CHIP DIGITAL FET
	Q405	2SK621	CHIP DIGITAL FET
	Q406	2SK621	CHIP DIGITAL FET
	Q407	2SK621	CHIP DIGITAL FET
	Q408	2SK621	CHIP DIGITAL FET
	Q409	2SK621	CHIP DIGITAL FET
	Q410	2SK621	CHIP DIGITAL FET

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	Q411	2SK621	CHIP DIGITAL FET
	Q412	2SK621	CHIP DIGITAL FET
	Q413	2SB709	CHIP TRANSISTOR
	Q414	2SK656	DIGITAL MOS FET
	D401	MA151WK	CHIP DIODE
	D402	MA151WA	CHIP DIODE
	D403	MA151WA	CHIP DIODE
	D404	MA151A	CHIP DIODE
	D405	–	–
	D406	–	–
	D407	MA3075M	CHIP ZENER DIODE
	OR	MA3075H	CHIP ZENER DIODE
	OR	RD7.5M-T1B2	CHIP ZENER DIODE
	OR	RD7.5M-T1B3	CHIP ZENER DIODE
	D408	MA151WA	CHIP DIODE
	D409	MA151K	CHIP DIODE
	R401	QRSA08J-153YN	CHIP R
	R402	QRSA08J-153YN	CHIP R
	R403	QRSA08J-153YN	CHIP R
	R404	QRSA08J-103YN	CHIP R
	R405	QRSA08J-103YN	CHIP R
	R406	QRSA08J-223YN	CHIP R
	R407	QRSA08J-153YN	CHIP R
	R408	–	–
	R409	–	–
	R410	–	–
	R411	QRSA08J-102YN	CHIP R
	R412	QRSA08J-102YN	CHIP R
	R413	QRSA08J-102YN	CHIP R
	R414	QRSA08J-105YN	CHIP R
	R415	QRSA08J-104YN	CHIP R
	R416	QRSA08J-104YN	CHIP R
	R417	QRSA08J-104YN	CHIP R
	R418	QRSA08J-104YN	CHIP R
	R419	QRSA08J-104YN	CHIP R
	R420	QRSA08J-104YN	CHIP R
	R421	QRSA08J-104YN	CHIP R
	R422	QRSA08J-104YN	CHIP R
	R423	QRSA08J-474YN	CHIP R
	R424	QRSA08J-105YN	CHIP R
	R425	QRSA08J-153YN	CHIP R
	R426	QRSA08J-102YN	CHIP R
	R427	QRSA08J-153YN	CHIP R
	R428	QRSA08J-153YN	CHIP R
	R429	QRSA08J-102YN	CHIP R
	R430	QRSA08J-102YN	CHIP R
	R431	QRSA08J-563YN	CHIP R
	R432	–	–
	R433	QRSA08J-474YN	CHIP R
	R434	QRSA08J-123YN	CHIP R
	R435	QRSA08J-224YN	CHIP R
	R436	PU59237-154	CHIP VR, BATTERY ALARM
	OR	PU57816-2-154	CHIP VR
	OR	PU59456-154	CHIP VR
	R437	QRSA08J-184YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R438	QRSA08J-474YN	CHIP R
	R439	QRSA08J-823YN	CHIP R
	R440	QRSA08K-475YN	CHIP R
	R441	QRSA08J-103YN	CHIP R
	R442	QRSA08J-105YN	CHIP R
	R443	QRSA08J-103YN	CHIP R
	R444	QRSA08J-103YN	CHIP R
	R445	QRSA08J-104YN	CHIP R
	R446	QRSA08J-181YN	CHIP R
	R447	QRSA08J-105YN	CHIP R
	R448	QRSA08J-684YN	CHIP R
	R449	QRSA08J-105YN	CHIP R
	R450	QRSA08J-102YN	CHIP R
	R451	QRSA08J-105YN	CHIP R
	R452	QRSA08J-125YN	CHIP R
	R453	QRSA08J-105YN	CHIP R
	R454	–	–
	R455	QRSA08J-153YN	CHIP R
	R456	QRSA08J-153YN	CHIP R
	R457	QRSA08J-153YN	CHIP R
	R458	–	–
	R459	–	–
	R460	–	–
	R461	QRSA08J-102YN	CHIP R
	R462	QRSA08J-102YN	CHIP R
	R463	QRSA08J-102YN	CHIP R
	R464	QRSA08J-564YN	CHIP R
	R465	QRSA08J-104YN	CHIP R
	R466	QRSA08J-225YN	CHIP R
	R467	QRSA08J-102YN	CHIP R
	R468	QRSA08J-104YN	CHIP R
	R469	QRSA08J-102YN	CHIP R
	R470	QRSA08J-104YN	CHIP R
	R471	QRSA08J-102YN	CHIP R
	R472	QRSA08J-104YN	CHIP R
	R473	QRSA08J-102YN	CHIP R
	R474	QRSA08J-104YN	CHIP R
	R475	QRSA08J-102YN	CHIP R
	R476	–	–
	R477	QRSA08J-104YN	CHIP R
	R478	QRSA08J-104YN	CHIP R
	R479	QRSA08J-222YN	CHIP R
	R480	QRSA08J-102YN	CHIP R
	R481	QRSA08J-102YN	CHIP R
	R482	QRSA08J-102YN	CHIP R
	R483	QRSA08J-102YN	CHIP R
	R484	QRSA08J-102YN	CHIP R
	R485	QRSA08J-102YN	CHIP R
	R486	QRSA08J-102YN	CHIP R
	R487	QRSA08J-102YN	CHIP R
	R488	QRSA08J-103YN	CHIP R
	R489	QRSA08J-103YN	CHIP R
	R490	QRSA08J-103YN	CHIP R
	R491	QRSA08J-103YN	CHIP R
	R492	QRSA08J-472YN	CHIP R
	R493	QRSA08J-472YN	CHIP R
	R494	QRSA08J-103YN	CHIP R
	R495	QRSA08J-103YN	CHIP R
	R496	QRSA08J-102YN	CHIP R

#⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
	R497	QRSA08J-103YN	CHIP R
	R498	QRSA08J-223YN	CHIP R
	R499	QRSA08J-103YN	CHIP R
	R500	QRSA08J-223YN	CHIP R
	R501	QRSA08J-103YN	CHIP R
	R502	QRSA08J-223YN	CHIP R
	R503	QRSA08J-103YN	CHIP R
	R504	QRSA08J-223YN	CHIP R
	R505	QRSA08J-103YN	CHIP R
	R506	QRSA08J-102YN	CHIP R
	R507	QRSA08J-102YN	CHIP R
	R508	QRSA08J-102YN	CHIP R
	R509	QRSA08J-102YN	CHIP R
	R510	QRSA08J-125YN	CHIP R
	R511	QRSA08J-102YN	CHIP R
	R512	QRSA08J-102YN	CHIP R
	R513	QRSA08J-102YN	CHIP R
	R514	QRSA08J-271YN	CHIP R
	R515	QRSA08J-102YN	CHIP R
	R516	QRSA08J-0R0Y	CHIP R
	R517	–	–
	R518	QRSA08J-682YN	CHIP R
	R519	QRD161J-103	CR
	C401	QCFA1EZ-104	CHIP CAP
	C402	QCFA1EZ-104	CHIP CAP
	C403	–	–
	C404	–	–
	C405	–	–
	C406	QCFA1HZ-473	CHIP CAP
	C407	QCYA1HK-222	CHIP CAP
	C408	–	–
	C409	–	–
	C410	–	–
	C411	–	–
	C412	QCFA1EZ-104	CHIP CAP
	C413	QER41HM-105	E CAP
	C414	QCSA1HJ-270	CHIP CAP
	C415	QCSA1HJ-270	CHIP CAP
	C416	QCFA1EZ-104	CHIP CAP
	C417	QEF81AM-475	CHIP T CAP
	C418	QCYA1HK-103	CHIP CAP
	C419	QCFA1EZ-104	CHIP CAP
	C420	QCSA1HJ-561	CHIP CAP
	C426	QEF81AM-475	CHIP T CAP
	C427	QCFA1EZ-104	CHIP CAP
	C428	QEF81AM-475	CHIP T CAP
	C429	QCSA1HJ-101	CHIP CAP
	C430	QCSA1HJ-101	CHIP CAP
	L401	PU59188-101K	CHIP COIL
⚠	CF401	PU58780	CERAMIC FILTER
	CF402	PU59892	CERAMIC FILTER

#⚠	REF.NO.	PART NO.	PART NAME, DESCRIPTION
⚠	TH401	PU52108-2R2	POSISTOR
	TP	PU56278	TEST PIN, TP401
	SH1	PU59997	SHEET
	SLD1	PQ42544	INSULATOR
	CN1	PU58655-3	CAP. HOUSING
	CN2	PU58655-3	CAP. HOUSING
	CN3	PU58655-2	CAP. HOUSING
	CN4	PU58655-4	CAP. HOUSING
	CN5A	PU58655-7	CAP. HOUSING
	CN6	PU58655-2	CAP. HOUSING
	CN7	PU58250-8	CAP. HOUSING
	CN8	PU58250-10	CAP. HOUSING
	CN9	PU58250-16	CAP. HOUSING
	CN10A	PU58655-5	CAP. HOUSING
	CN10B	PU58253-7	CAP. HOUSING
	CN11	PU58250-10	CAP. HOUSING
	CN12	PU58250-10	CAP. HOUSING
	CN13	PU58655-7	CAP. HOUSING
	CN14	PU58655-2	CAP. HOUSING
	CN15	PU58655-3	CAP. HOUSING
	CN16	PU58655-2	CAP. HOUSING
	CN17	PU58655-5	CAP. HOUSING
	CN18	PU58655-14	CAP. HOUSING
	CN19	PU58655-4	CAP. HOUSING
	CN20	PU58655-4	CAP. HOUSING
	CN21	PU58655-3	CAP. HOUSING
		PU11506A1-02-C	**Y/C BOARD ASS'Y [02]**
	IC1	AN3212S	FLAT IC
	IC2	H8D7025B	INTEGRATED CIRCUIT
	IC3	AN3323S	FLAT IC
	IC4	H8DN7026A	INTEGRATED CIRCUIT
	IC5	BX7383	INTEGRATED CIRCUIT
	IC6	BA7241F	FLAT IC
	IC7	H8D70048	INTEGRATED CIRCUIT
	IC8	H8D19278	INTEGRATED CIRCUIT
	IC9	H8D7027A	INTEGRATED CIRCUIT
	IC10	THE045A	INTEGRATED CIRCUIT

# ⚠	REF. NO.		PART NO.	PART NAME, DESCRIPTION
	IC11		BA7131F	FLAT IC
	Q1		DTC144EK	CHIP DIGITAL TRANSISTOR
	Q2		DTC144EK	CHIP DIGITAL TRANSISTOR
	Q3		2SC2412K	CHIP TRANSISTOR
		OR	2SD601	CHIP TRANSISTOR
	Q4		2SC2412K	CHIP TRANSISTOR
		OR	2SD601	CHIP TRANSISTOR
	Q5		DTC144EK	CHIP DIGITAL TRANSISTOR
	Q6		DTC144EK	CHIP DIGITAL TRANSISTOR
	Q7		DTC144EK	CHIP DIGITAL TRANSISTOR
	Q8		DTC144EK	CHIP DIGITAL TRANSISTOR
	Q9		2SC2412K	CHIP TRANSISTOR
		OR	2SD601	CHIP TRANSISTOR
	Q10		2SC2412K	CHIP TRANSISTOR
		OR	2SD601	CHIP TRANSISTOR
	Q11		DTC114YK	CHIP DIGITAL TRANSISTOR
	Q12		–	–
	Q13		–	–
	Q14		2SC2412K	CHIP TRANSISTOR
		OR	2SD601	CHIP TRANSISTOR
	D1		–	–
	D2		DAN202K	CHIP DIODE
		OR	MA151WK	CHIP DIODE
	D3		DAN202K	CHIP DIODE
		OR	MA151WK	CHIP DIODE
	D4		DAN202K	CHIP DIODE
		OR	MA151WK	CHIP DIODE
	D5		DAN202K	CHIP DIODE
		OR	MA151WK	CHIP DIODE
	D6		DAN202K	CHIP DIODE
		OR	MA151WK	CHIP DIODE
	D7		DAN202K	CHIP DIODE
		OR	MA151WK	CHIP DIODE
	R1		PU59237-102	CHIP VR, REC FM LEVEL
		OR	PU59456-102	CHIP VR
	R2		PU59237-473	CHIP VR, WHITE CLIP
		OR	PU59456-473	CHIP VR
	R3		PU59237-473	CHIP VR, DARK CLIP
		OR	PU59456-473	CHIP VR
	R4		PU59237-153	CHIP VR, CARRIER
		OR	PU59456-153	CHIP VR
	R5		PU59237-103	CHIP VR, DEVIATION
		OR	PU59456-103	CHIP VR
	R6		PU59237-222	CHIP VR, NOISE CANCEL
		OR	PU59456-222	CHIP VR
	R7		PU59237-473	CHIP VR, Y LEVEL
		OR	PU59456-473	CHIP VR
	R8		PU59237-473	CHIP VR, REC GAIN
		OR	PU59456-473	CHIP VR
	R9		PU59237-102	CHIP VR, EE Y LEVEL
		OR	PU59456-102	CHIP VR
	R10		PU59237-222	CHIP VR, VIDEO EQ
		OR	PU59456-222	CHIP VR
	R11		PU59237-102	CHIP VR, EE BURST LEVEL
		OR	PU59456-102	CHIP VR

# ⚠	REF. NO.		PART NO.	PART NAME, DESCRIPTION
	R12		PU59237-681	CHIP VR, REC COLOUR LEVEL
		OR	PU59456-681	CHIP VR
	R13		PU59237-102	CHIP VR, BURST LEVEL
		OR	PU59456-102	CHIP VR
	R14		PU59237-473	CHIP VR, AFC
		OR	PU59456-473	CHIP VR
	R15		PU59237-102	CHIP VR, PB COLOUR LEVEL
		OR	PU59456-102	CHIP VR
	R16		QRSA08J-222YN	CHIP R
	R17		QRSA08J-821YN	CHIP R
	R18		QRSA08J-103YN	CHIP R
	R19		QRSA08J-682YN	CHIP R
	R20		QRSA08J-680YN	CHIP R
	R21		QRSA08J-473YN	CHIP R
	R22		QRSA08J-152YN	CHIP R
	R23		QRSA08J-562YN	CHIP R
	R24		QRSA08J-332YN	CHIP R
	R25		QRSA08J-821YN	CHIP R
	R26		QRSA08J-562YN	CHIP R
	R27		QRSA08J-332YN	CHIP R
	R28		QRSA08J-393YN	CHIP R
	R29		QRSA08J-562YN	CHIP R
	R30		QRSA08J-102YN	CHIP R
	R31		QRSA08J-223YN	CHIP R
	R32		QRSA08J-332YN	CHIP R
	R33		QRSA08J-681YN	CHIP R
	R34		–	–
	R35		QRSA08J-822YN	CHIP R
	R36		QRSA08J-102YN	CHIP R
	R37		QRD161J-561	CR
	R38		QRSA08J-471YN	CHIP R
	R39		QRSA08J-471YN	CHIP R
	R40		QRSA08J-153YN	CHIP R
	R41		QRSA08J-562YN	CHIP R
	R42		QRSA08J-182YN	CHIP R
	R43		QRSA08J-222YN	CHIP R
	R44		QRSA08J-332YN	CHIP R
	R45		QRSA08J-332YN	CHIP R
	R46		QRSA08J-103YN	CHIP R
	R47		QRSA08J-103YN	CHIP R
	R48		QRSA08J-333YN	CHIP R
	R49		QRSA08J-473YN	CHIP R
	R50		QRSA08J-222YN	CHIP R
	R51		QRSA08J-393YN	CHIP R
	R52		QRSA08J-393YN	CHIP R
	R53		–	–
	R54		QRSA08J-122YN	CHIP R
	R55		QRSA08J-122YN	CHIP R
	R56		QRSA08J-152YN	CHIP R
	R57		QRSA08J-0R0Y	CHIP R
	R58		QRSA08J-102YN	CHIP R
	R59		QRSA08J-331YN	CHIP R
	R60		QRSA08J-102YN	CHIP R
	R61		QRSA08J-222YN	CHIP R
	R62		QRSA08J-103YN	CHIP R
	R63		QRSA08J-152YN	CHIP R
	R64		QRSA08J-103YN	CHIP R
	R66		QRSA08J-332YN	CHIP R
	R67		QRSA08J-103YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R68	QRSA08J-103YN	CHIP R
	R69	QRSA08J-471YN	CHIP R
	R70	QRSA08J-153YN	CHIP R
	R71	–	–
	R72	QRSA08J-682YN	CHIP R
	R73	QRSA08J-0R0Y	CHIP R
	R74	QRSA08J-0R0Y	CHIP R
	R75	QRSA08J-0R0Y	CHIP R
	R76	–	–
	R77	QRSA08J-0R0Y	CHIP R
	R78	QRSA08J-0R0Y	CHIP R
	R79	QRSA08J-0R0Y	CHIP R
	R80	–	–
	R81	QRSA08J-153YN	CHIP R
	R82	QRSA08J-122YN	CHIP R
	R83	–	–
	R84	QRSA08J-122YN	CHIP R
	R85	QRSA08J-393YN	CHIP R
	R86	QRSA08J-102YN	CHIP R
	R87	QRSA08J-102YN	CHIP R
	R88	QRSA08J-0R0Y	CHIP R
	R89	QRSA08J-271YN	CHIP R
	R90	QRSA08J-271YN	CHIP R
	R91	QRSA08J-0R0Y	CHIP R
	R92	QRSA08J-0R0Y	CHIP R
	R93	QRSA08J-223YN	CHIP R
	R99	QRD167J-155	CR
	R104	QRSA08J-0R0Y	CHIP R
	R124	QRD161J-271	CR
	C1	ECEV1HV3R3	CHIP E CAP
	C2	QCYA1HK-103	CHIP CAP
	C3	QCYA1HK-103	CHIP CAP
	C4	QCSA1HJ-151	CHIP CAP
	C5	QCYA1HK-103	CHIP CAP
	C6	QCSA1HJ-5R0	CHIP CAP
	C7	QCTA1CH-390	CHIP CAP
	C8	QEF80JM-476	CHIP T CAP
	C9	QCSA1HJ-181	CHIP CAP
	C10	QEF80JM-225	CHIP T CAP
	C11	QCYA1EK-223	CHIP CAP
	C12	QCSA1HJ-391	CHIP CAP
	C13	QCSA1HJ-471	CHIP CAP
	C14	QCSA1HJ-151	CHIP CAP
	C15	QCYA1HK-103	CHIP CAP
	C16	QCYA1HK-222	CHIP CAP
	C17	QEF80JM-225	CHIP T CAP
	C18	QEF80JM-475	CHIP T CAP
	C19	ECEV0JV220	CHIP E CAP
	C20	QEF81AM-335	CHIP T CAP
	C21	QCSA1HJ-680	CHIP CAP
	C22	QEF81AM-105	CHIP T CAP
	C23	QCYA1HK-103	CHIP CAP
	C24	QCSA1HJ-270	CHIP CAP

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C25	QCYA1HK-103	CHIP CAP
	C26	QCYA1HK-103	CHIP CAP
	C27	QCYA1HK-103	CHIP CAP
	C28	QCSA1HJ-390	CHIP CAP
	C29	QCYA1HK-103	CHIP CAP
	C30	QCSA1HJ-120	CHIP CAP
	C31	QCYA1HK-103	CHIP CAP
	C32	QCYA1HK-103	CHIP CAP
	C33	QCYA1EK-223	CHIP CAP
	C34	QCYA1HK-103	CHIP CAP
	C35	ECEV0JV220	CHIP E CAP
	C36	QCYA1HK-103	CHIP CAP
	C37	QCYA1EK-223	CHIP CAP
	C38	QCYA1HK-103	CHIP CAP
	C39	ECEV1CV100	CHIP E CAP
	C40	QEF80JM-475	CHIP T CAP
	C41	QER41CM-106	E CAP
	C42	ECEV1CV100	CHIP E CAP
	C43	QCYA1HK-103	CHIP CAP
	C44	ECEV1CV100	CHIP E CAP
	C45	ECEV0JV220	CHIP E CAP
	C46	QCYA1HK-103	CHIP CAP
	C47	QCYA1HK-103	CHIP CAP
	C48	ECEV1CV100	CHIP E CAP
	C49	QEF81AM-105	CHIP T CAP
	C50	–	–
	C51	ECEV1CV100	CHIP E CAP
	C52	QCSA1HJ-560	CHIP CAP
	C53	QCSA1HJ-680	CHIP CAP
	C54	QCYA1HK-103	CHIP CAP
	C55	QCYA1HK-103	CHIP CAP
	C56	QCYA1HK-103	CHIP CAP
	C57	QCSA1HJ-330	CHIP CAP
	C58	QCYA1HK-103	CHIP CAP
	C59	PU56274B-200	CHIP TR CAP, AFC
	C60	QCYA1HK-103	CHIP CAP
	C61	QCYA1HK-103	CHIP CAP
	C62	QCYA1HK-103	CHIP CAP
	C63	ECEV0JV220	CHIP E CAP
	C64	QEF81AM-105	CHIP T CAP
	C65	–	–
	C66	QEF81AM-105	CHIP T CAP
	C67	–	–
	C68	QCYA1HK-103	CHIP CAP
	C71	QER41EM-475	E CAP
	C77	QCS11HJ-270	C CAP
	C83	QCS11HJ-560	C CAP

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
⚠	L1	PU59888-470K	CHIP COIL
⚠	L2	PU59888-470K	CHIP COIL
⚠	L3	PU58627-120J	CHIP COIL
	OR	PU58201-120J	CHIP COIL
	OR	PU59152-120	CHIP COIL
⚠	L4	PU58627-120J	CHIP COIL
	OR	PU58201-120J	CHIP COIL
	OR	PU59152-120	CHIP COIL
	L5	–	–
	L6	PU58627-680J	CHIP COIL
	OR	PU58201-680J	CHIP COIL
	L7	PU58627-680J	CHIP COIL
	OR	PU58201-680J	CHIP COIL
	L8	–	–
⚠	L9	PU59888-470K	CHIP COIL
	L10	PU58627-101K	CHIP COIL
	OR	PU58201-101K	CHIP COIL
	L11	–	–
⚠	L12	PU59888-470K	CHIP COIL
⚠	L13	PU59888-470K	CHIP COIL
	L14	PU58627-220J	CHIP COIL
	OR	PU58201-220J	CHIP COIL
	L17	PU59152-270J	CHIP COIL
	L18	PU59152-470J	CHIP COIL
	DL1	PU59472	1H DELAY LINE
	DL2	PU59473-2	2H COMB FILTER
	LPF1	PU59474-3	CHIP LOW PASS FILTER
	LPF2	PU59475-2	CHIP LOW PASS FILTER
	LPF3	PU59476-2	CHIP LOW PASS FILTER
	HPF1	PU59479-3	CHIP HIGH PASS FILTER
	BPF1	PU59477	CHIP BAND PASS FILTER
	BPF2	PU59478	CHIP BAND PASS FILTER
	EQ1	PU59480-3	CHIP EQUALIZER
	EQ2	PU59031	FH TRAP COIL
⚠	X1	PU31449-2	CRYSTAL
	TP	PU56278	TEST PIN, TP1 – 14
	SPC1	PQ42625	SPACER
	SPC2	PQM30029-58	SPACER

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	SLD1	PQ42942	SHIELD TAPE
	SH1	PQ42945	M. SHEET
	CN1	PU58655-2	CAP. HOUSING
	CN2	PU58655-2	CHP. HOUSING
	CN3	PU58251-10	CAP. HOUSING
	CN4	PU58251-10	CAP. HOUSING
	CN5	PU59636-12	CAP. HOUSING
		–	S/S BOARD ASS'Y
	Q12	DTA114EK	CHIP DIGITAL TRANSISTOR
	Q13	DTC114YK	CHIP DIGITAL TRANSISTOR
	Q15	DTC144EK	CHIP DIGITAL TRANSISTOR
	Q16	DTC144EK	CHIP DIGITAL TRANSISTOR
	D10	DAN202K	CHIP DIODE
	R95	QRSA08J-103YN	CHIP R
	R96	QRSA08J-103YN	CHIP R
	R97	QRSA08J-103YN	CHIP R
	R98	QRSA08J-680YN	CHIP R
	R100	QRSA08J-0R0Y	CHIP R
	R111	QRSA08J-103YN	CHIP R
	C74	QCYA1EK-223	CHIP CAP
	C75	QCYA1EK-223	CHIP CAP
		–	APC BOARD ASS'Y
	D8	DAN202K	CHIP DIODE
	R94	QRSA08J-103YN	CHIP R
	R110	QRSA08J-152YN	CHIP R
		–	EQ BOARD ASS'Y
	R65	QRSA08J-102YN	CHIP R
	EQ3	PU59857	CHIP EQUALIZER

#⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
		–	NOISE MIX BOARD ASS'Y
	Q20	DTC144EK	CHIP DIGITAL TRANSISTOR
	D15	DA204K	CHIP DIODE
	R120	QRSA08J-682YN	CHIP R
	R121	QRSA08J-222YN	CHIP R
	R123	QRSA08J-472YN	CHIP R
	R124	QRSA08J-124YN	CHIP R
	C80	QCYA1EK-223	CHIP CAP
	C81	QCSA1HJ-820	CHIP CAP
	C82	QCYA1EK-223	CHIP CAP

		TME043A	PREAMP IC [04], EG
		TME043B	PREAMP IC [04], EK

		PU22428B-03-C	SKEW JUMP BOARD ASS'Y [12]
	IC1	AN3592S	FLAT IC
	IC2	MSM6989MS	FLAT IC
	IC3	TA7374P	INTEGRATED CIRCUIT
	IC4	AN8009	INTEGRATED CIRCUIT
	Q1	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q2	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q3	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q4	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q5	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q6	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q7	2SA1037K	CHIP TRANSISTOR
	OR	2SB709	CHIP TRANSISTOR
	Q8	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q9	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q10	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q11	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q12	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q13	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	Q14	2SC2412K	CHIP TRANSISTOR
	OR	2SD601	CHIP TRANSISTOR
	R1	QRSA08J-332YN	CHIP R
	R2	QRSA08J-391YN	CHIP R
	R3	QRSA08J-123YN	CHIP R
	R4	QRSA08J-104YN	CHIP R
	R5	QRSA08J-102YN	CHIP R
	R6	QRSA08J-473YN	CHIP R
	R7	QRSA08J-821YN	CHIP R
	R8	QRSA08J-272YN	CHIP R
	R9	QRSA08J-222YN	CHIP R
	R10	PU59237-222	CHIP VR, INVERTED COL LEV
	OR	PU59456-222	CHIP VR
	R11	QRD161J-223	CR
	R12	QRSA08J-103YN	CHIP R
	R13	QRSA08J-154YN	CHIP R
	R14	QRSA08J-221YN	CHIP R
	R15	QRSA08J-393YN	CHIP R
	R16	PU59237-473	CHIP VR, 0.5H DET
	OR	PU59456-473	CHIP VR
	R17	QRSA08J-222YN	CHIP R
	R18	QRSA08J-561YN	CHIP R
	R19	QRSA08J-561YN	CHIP R
	R20	QRSA08J-393YN	CHIP R
	R21	QRSA08J-223YN	CHIP R
	R22	QRSA08J-471YN	CHIP R
	R23	QRSA08J-222YN	CHIP R
	R24	QRSA08J-681YN	CHIP R
	R25	QRSA08J-681YN	CHIP R
	R26	QRSA08J-471YN	CHIP R
	R27	QRSA08J-561YN	CHIP R
	R28	QRSA08J-681YN	CHIP R
	R29	QRSA08J-153YN	CHIP R
	R30	QRSA08J-223YN	CHIP R
	R31	QRSA08J-122YN	CHIP R
	R32	QRSA08J-102YN	CHIP R
	R33	QRSA08J-152YN	CHIP R
	R34	PU59237-103	CHIP VR, DELAYED V LEV
	OR	PU59456-103	CHIP VR
	R35	QRSA08J-393YN	CHIP R
	R36	QRSA08J-473YN	CHIP R
	R37	QRSA08J-222YN	CHIP R
	R38	QRSA08J-103YN	CHIP R
	R39	QRSA08J-223YN	CHIP R
	R40	QRSA08J-103YN	CHIP R
	R41	QRSA08J-681YN	CHIP R
	R42	QRSA08J-681YN	CHIP R
	R43	QRSA08J-681YN	CHIP R
	R44	QRSA08J-391YN	CHIP R
	R45	QRSA08J-562YN	CHIP R
	R46	QRSA08J-473YN	CHIP R
	R47	QRSA08J-473YN	CHIP R
	R48	QRSA08J-333YN	CHIP R

# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	R49	QRSA08J-333YN	CHIP R
	R50	QRSA08J-122YN	CHIP R
	R51	QRSA08J-471YN	CHIP R
	R52	QRSA08J-152YN	CHIP R
	R53	QRSA08J-333YN	CHIP R
	R54	QRSA08J-333YN	CHIP R
	R55	QRSA08J-122YN	CHIP R
	R56	QRSA08J-272YN	CHIP R
	R57	QRSA08J-222YN	CHIP R
	R58	QRSA08J-0R0Y	CHIP R
	R59	QRSA08J-0R0Y	CHIP R
	R60	QRSA08J-0R0Y	CHIP R
	R61	QRSA08J-0R0Y	CHIP R
	R62	QRD161J-471	CR
	C1	QCYA1HK-332	CHIP CAP
	C2	QCYA1HK-152	CHIP CAP
	C3	QEF81AM-475	CHIP T CAP
	C4	QEF81AM-105	CHIP T CAP
	C5	QEF81AM-105	CHIP T CAP
	C6	QCYA1HK-102	CHIP CAP
	C7	QCSA1HJ-220	CHIP CAP
	C8	QCYA1HK-103	CHIP CAP
	C9	QCSA1HJ-220	CHIP CAP
	C10	QCYA1HK-103	CHIP CAP
	C11	QCYA1HK-103	CHIP CAP
	C12	QCYA1HK-103	CHIP CAP
	C13	QCYA1EK-223	CHIP CAP
	C14	QEF80JM-476	CHIP T CAP
	C15	QCYA1HK-222	CHIP CAP
	C16	QCYA1HK-103	CHIP CAP
	C17	QCYA1HK-222	CHIP CAP
	C18	QEF81AM-105	CHIP T CAP
	C19	QCYA1EK-223	CHIP CAP
	C20	QCYA1HK-103	CHIP CAP
	C21	QCSA1HJ-151	CHIP CAP
	C22	QEK41AM-107	E CAP
	C23	–	–
	C24	QCSA1HJ-220	CHIP CAP
	C25	QEF80JM-476	CHIP T CAP
	C26	QCSA1HJ-270	CHIP CAP
	C27	QCSA1HJ-330	CHIP CAP
	C28	QEF81AM-106	CHIP T CAP
	C29	–	–
	C30	QCYA1HK-103	CHIP CAP
	C31	QCYA1HK-103	CHIP CAP
	C32	QER40JM-476	E CAP
	C33	QCC11HP-223	C CAP
	C34	QCYA1HK-103	CHIP CAP
	C35	QCYA1HK-103	CHIP CAP
	C36	QEF81VM-104	CHIP T CAP
	C37	QEF81AM-475	CHIP T CAP
	C38	QCYA1HK-103	CHIP CAP
	C39	QCSA1HJ-390	CHIP CAP
	C40	QCYA1HK-102	CHIP CAP
	C41	QEF80JM-475	CHIP T CAP

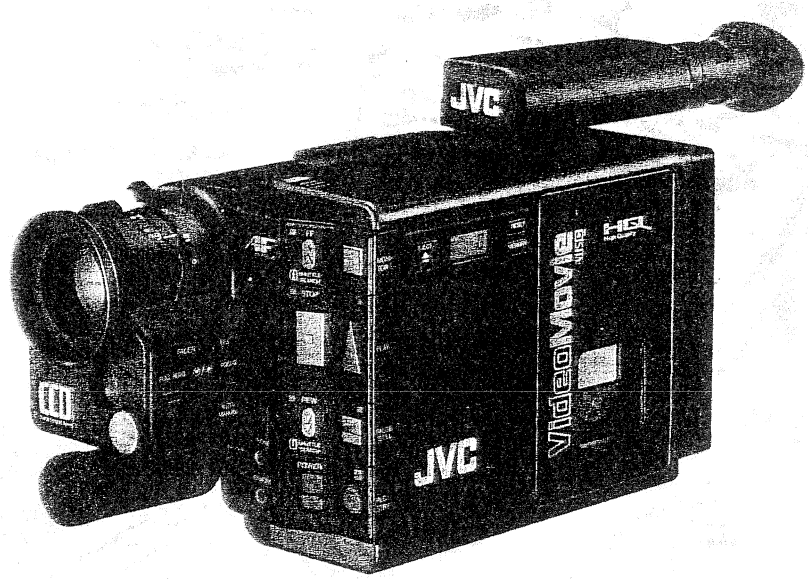
# ⚠	REF. NO.	PART NO.	PART NAME, DESCRIPTION
	C42	QCYA1HK-103	CHIP CAP
	C43	QCSA1HJ-100	CHIP CAP
	C44	QCYA1HK-103	CHIP CAP
	C45	–	–
	C46	QEF81AM-105	CHIP T CAP
	C47	QCYA1EK-223	CHIP CAP
	C48	QCYA1EK-223	CHIP CAP
	C49	QEF81AM-105	CHIP T CAP
	C50	QCYA1HK-103	CHIP CAP
	C51	QEF81VM-224	CHIP T CAP
	C52	QEF81CM-106	CHIP T CAP
	C53	QCYA1HK-103	CHIP CAP
	L1	PU59482-2	LC BLOCK
	L2	PU58627-330J	CHIP COIL
	OR	PU58201-330J	CHIP COIL
	L3	PU59483	LC BLOCK
	L4	PU58627-100J	CHIP COIL
	OR	PU58201-100J	CHIP COIL
	L5	PU59888-470J	CHIP COIL
	L6	PU59888-470J	CHIP COIL
	L7	PU58627-390J	CHIP COIL
	OR	PU58201-390J	CHIP COIL
	L8	PU58627-560J	CHIP COIL
	OR	PU58201-560J	CHIP COIL
	L9	–	–
	L10	PU59888-470J	CHIP COIL
	TP	PU56278	TEST PIN, TP1 – 11
	FW1	PU59865-12	FLAT WIRE
	SLD1	PU59947-2	SHIELD PLATE

JVC

SERVICE MANUAL

VIDEOMOVIE VHS C PAL

GR-C7EG EINSTELLANWEISUNG



HQ High Quality

TECHNISCHE DATEN

Format	: VHS Standard
Spannungsversorgung	: 9,6 V Gleichstrom
Leistungsaufnahme	: 8,0 Watt
Signalsystem	: PAL
Aufnahmesystem	: Luminanz: FM-Aufnahme Farbe: Direktaufnahme mit herabgesetztem Hilfsträger Entspricht dem VHS-Standard
Kassette	: VHS-C-Kassette
Bandgeschwindigkeit	
(SP)	: 23,39 mm/sek.
(LP)	: 11,70 mm/sek.
Aufnahmezeit	
(SP)	: 30 Min. (EC-30)
(LP)	: 60 Min. (EC-30)
VIDEO	
Ausgang	: 1 Vss, 75 Ohm, unsymmetrisch (über AV OUT-Buchse)
Störspannungs-abstand	: –40 dB (mit Rohde & Schwarz-Störspannungsmesser)
AUDIO	
Ausgang	: –6 dBs, 1 kOhm (über AV OUT-Buchse)
Mikrofoneingang	: –68 dBs, hochohmig, unsymmetrisch

Bildwandler	: 1/2"-CCD
Erforderliche Mindestbeleuchtung	: 15 Lux (bei Blende 1,6)
Lichtbereich	: 15 — 100.000 Lux
Objectiv	: F 1,6 f = 9 — 54 mm, 6:1-Motorzoom-Objektiv mit automatischer Blendenregelung und Makroposition, Filterdurchmesser 49 mm
Sucher	: Elektronischer Sucher mit 0,6" S/W-Bildröhre
Farbtemperatur-Umschaltung	: Einstellbar (3.200K/5.500K)
Weißbalance-Regelung	: Automatisch/Standard-Voreinstellugn
Betriebstemperatur	: 0° C bis +40° C
Zulässige Luftfeuchtigkeit	: Unter 80 %
Lagerungstemperatur	: –20° C bis +50° C
Gewicht	: 1,4 kg (inkl. Sucher)
Abmessungen	: 121(B) x 165(H) x 223(T) mm (inkl. Sucher)

Technische Änderungen vorbehalten!

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ABSCHNITT 1
AUSBAU

1.1 AUSBAU

1. 1. 1. Abnehmen des elektronischen Suchers

1. Unter Bezugnahme auf Abb. 1-1-1 den 8pol. Stecker abziehen. Unter leichter Druckausübung nach oben den Sucher zur Abnahme in Pfeilrichtung Ⓐ ziehen.

1. 1. 2 Sucherschuh und oberes Gehäuse

1. Die in Abb. 1-1-2(A) mit A bezeichneten Schrauben entfernen. Den Schuh in Pfeilrichtung Ⓑ anheben und zusammen mit der Schuhklemme abnehmen.
2. Unter Bezugnahme auf Abb. 1-1-2(A) und 1-1-2(B) die Schrauben C, D, E, F und G (zwei Schrauben) entfernen.
3. Wie in Abb. 1-1-2(C) gezeigt, ist das obere Gehäuse über eine Kunststoffzunge mit der Frontblende verbunden. An der Position der Kunststoffzunge leicht andrücken und dann das obere Gehäuse in Pfeilrichtung Ⓗ nach oben etwas anheben. Nun das Zählwerkdisplay abziehen (darauf achten, das flexible Kabel nicht zu beschädigen) und dann das obere Gehäuse komplett abnehmen.

Hinweis: Die beiden Schrauben A von Abb. 1-1-2(A) sind die längsten.

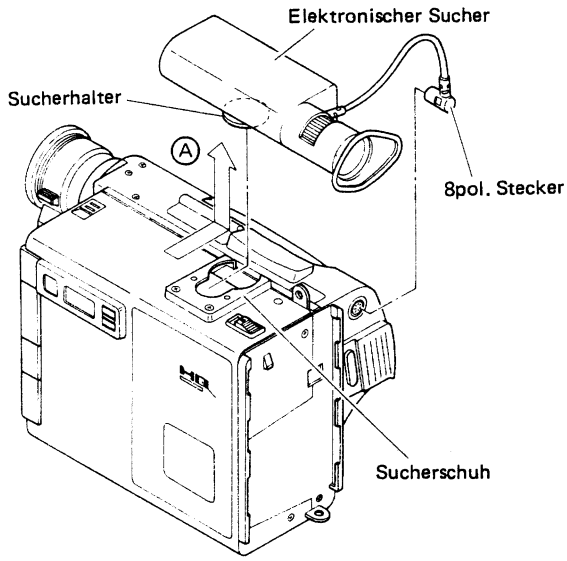


Abb. 1-1-1

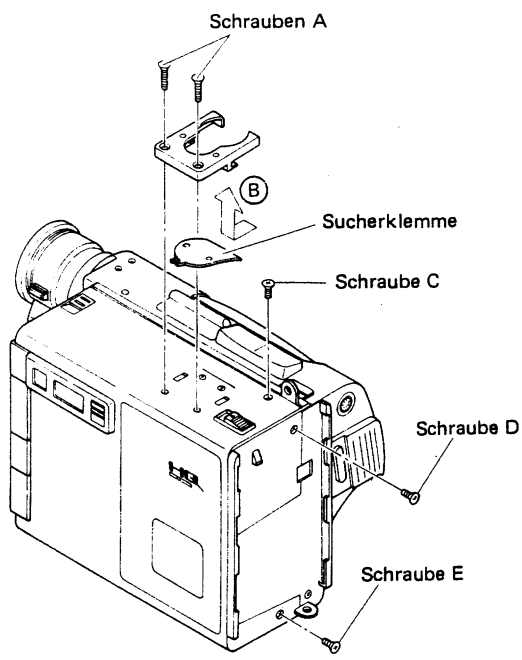


Abb. 1-1-2(A)

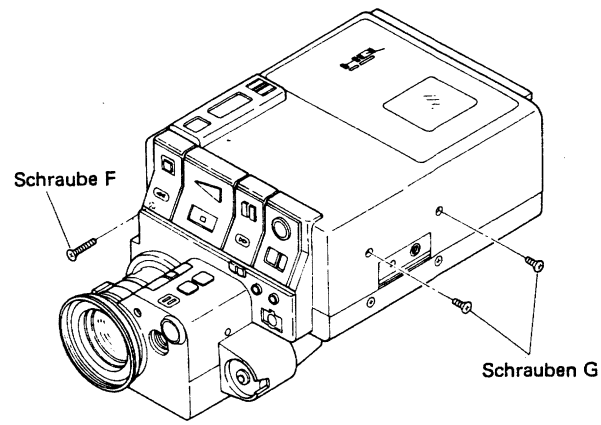


Abb. 1-1-2(B)

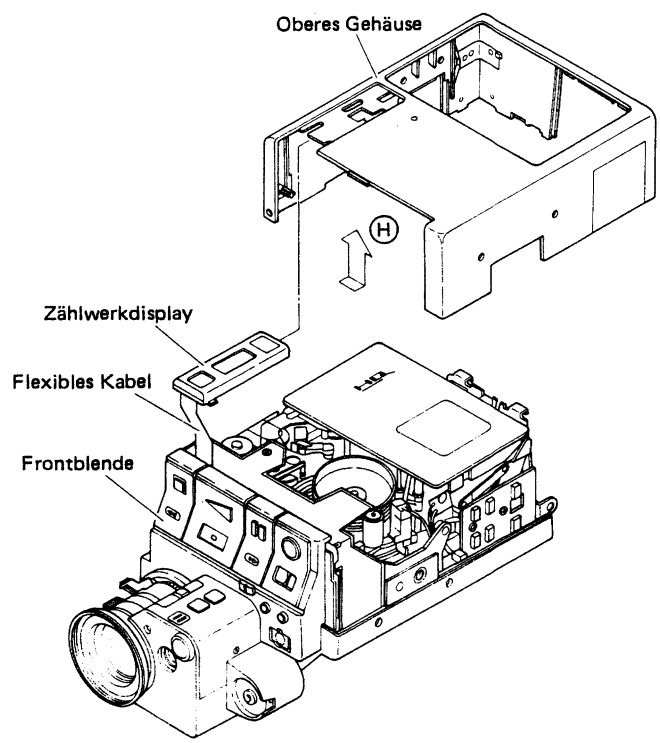


Abb. 1-1-2(C)

1. 1. 3 Kassettenhalterabdeckung und Rekorderteil

1. Unter Bezugnahme auf Abb. 1-1-3 die beiden Schrauben A für die Kassettenhalterabdeckung entfernen. Die Abdeckung in Pfeilrichtung Ⓑ abziehen.
2. Die beiden Schrauben C entfernen und die Halterung abnehmen.
3. Die drei Schrauben D und Schraube E entfernen.
4. Frontblende und Seitenverkleidung sind in einer Kunststoffrille eingerastet. Die Seitenverkleidung zwischen Daumen und Zeigefinger seitlich fassen und vorsichtig in Pfeilrichtung Ⓚ drücken, dann den Rekorderteil leicht anheben, so daß er ausrastet.
5. Die Anschlüsse F, G, H, I und J lösen. Rekorderteil und Bedienfeld können nun vom Kamerateil getrennt ewerden.

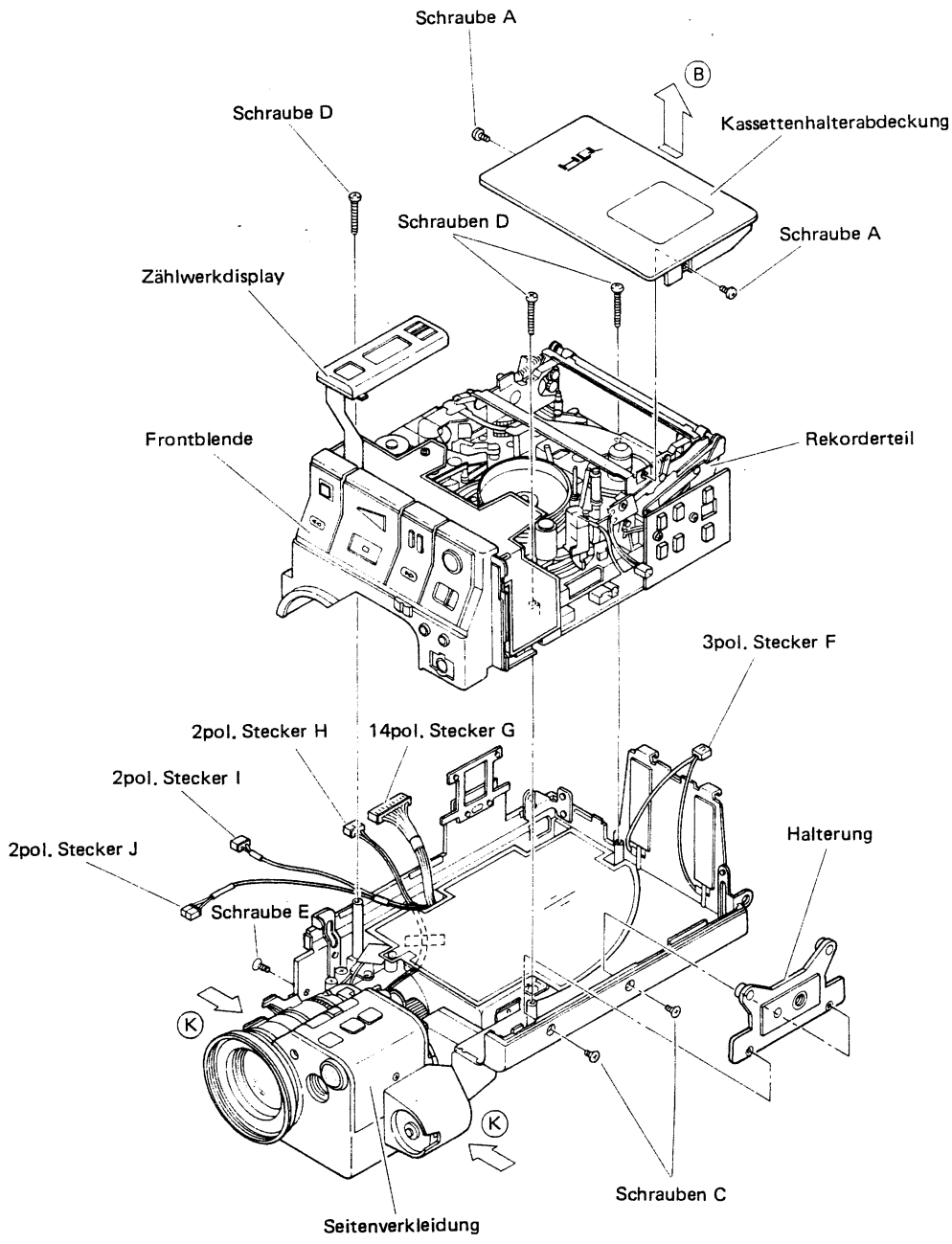


Abb. 1-1-3

1. 1. 4 Unteres Gehäuse

1. Unter Bezugnahme auf Abb. 1-1-4 die Schrauben A und B entfernen und die Isolationsplatte entnehmen.
2. Die Schrauben C, D und E entfernen. Die Seitenverkleidung durch Ziehen und Anheben in Pfeilrichtung Ⓕ vom Unterteil lösen. Stecker G abziehen.
3. Schrauben H und I sowie Platte J entfernen. Dann Schrauben K und L entfernen.
4. Den Kamerateil etwas anheben und Stecker M, N und O abziehen (die mit der EE & IND-Platine verbunden sind), dann den Kamerateil aus dem unteren Gehäuse entnehmen.

Hinweis: Darauf achten, Litzen und flexible Kabel nicht zu beschädigen.

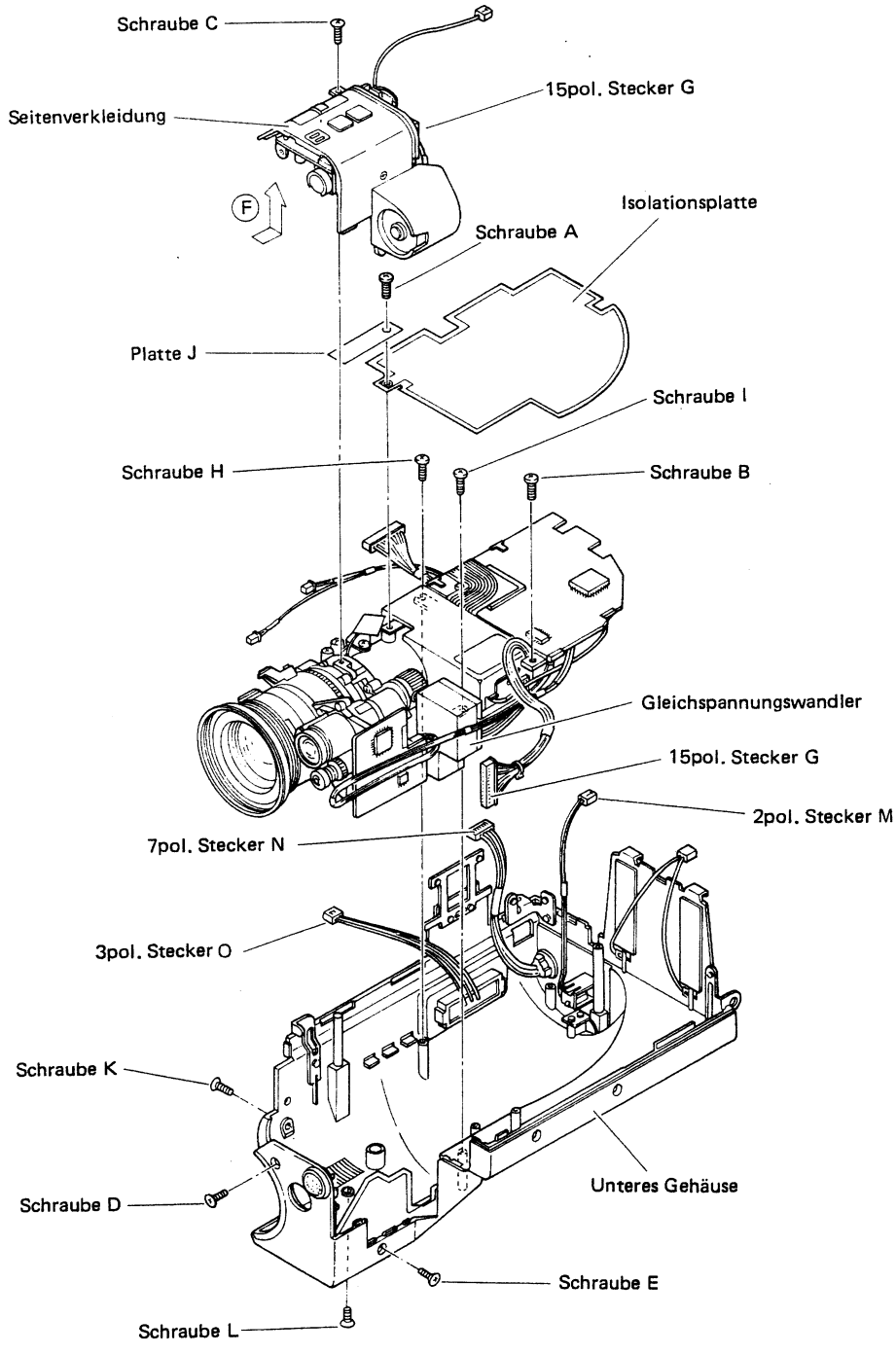
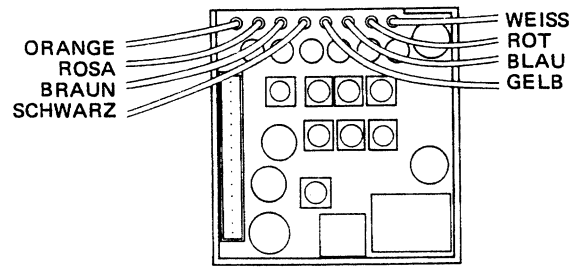


Abb. 1-1-4

1.2 AUSBAU DER PLATINEN

1.2.1 Rekorderteil

1 Unter Bezugnahme auf Abb. 1-2-1 die Frontblende in Pfeilrichtung Ⓐ abnehmen. Zum Abbau der Bedienelementplatine die drei Schrauben B und zwei Schrauben C entfernen. Hierbei besonders auf Drucktasten der Frontblende achten.
2. Die Schrauben J und K entfernen und Abschirmung die abnehmen. Dann S. JUMP-Platine und Y/C-Platine in Richtung Ⓓ abnehmen und den an der Vorverstärkerplatine angeschlossenen Stecker E abziehen.
3. Schraube F entfernen. Das die Hauptplatine sichernde Klebeband abziehen. Die 12 Stecker G abziehen und die Hauptplatine in Richtung Ⓗ abnehmen.
4. Die beiden Schrauben I entfernen und die Bandendesensor-Platine abnehmen.



1-2-1(B) Vorverstärkerverdrahtung

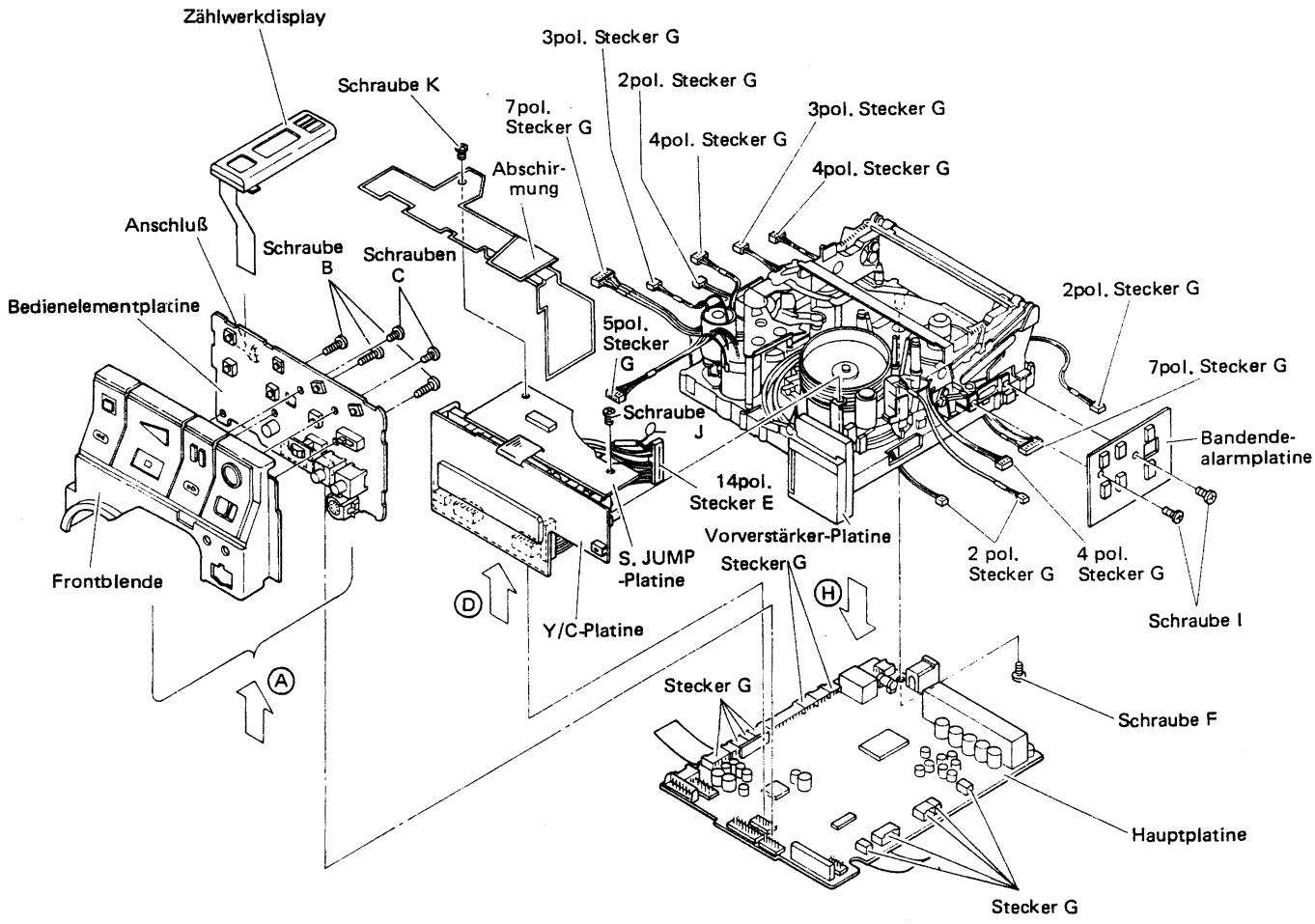


Abb. 1-2-1 (A)

1. 2. 2 Steuerplatine

1. Unter Bezugnahme auf Abb. 1-2-2 die vier Schrauben A entfernen. Stecker B abziehen und die Steuerplatine von der Seitenverkleidung abziehen.

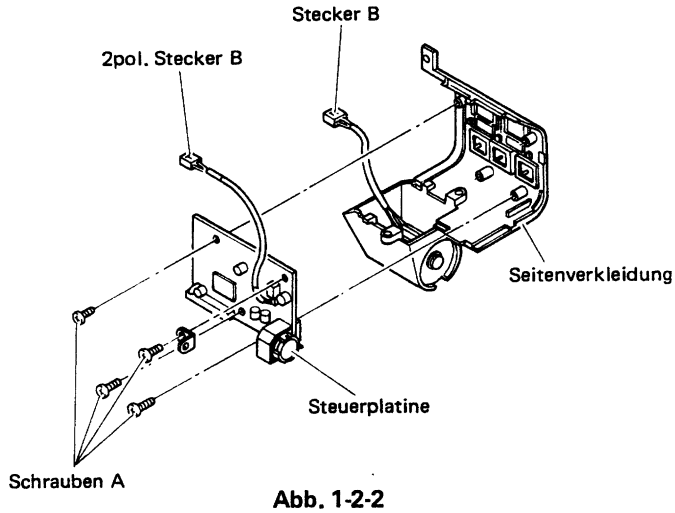


Abb. 1-2-2

1. 2. 3 Kamerteil

1. Unter Bezugnahme auf Abb. 1-2-3 Stecker A abziehen. Platinenhalter B und C in Richtung Ⓓ und Ⓔ abziehen.
2. Die Reglerplatine und die EE & IND-Platine in Richtung Ⓕ bzw. Ⓖ abziehen.
3. Die Reglerplatine ist über einen 8pol. Stecker direkt mit der EE & IND-Platine verbunden. Die EE & IND-Platine wiederum ist über drei Stecker direkt mit der Videoplatine verbunden.

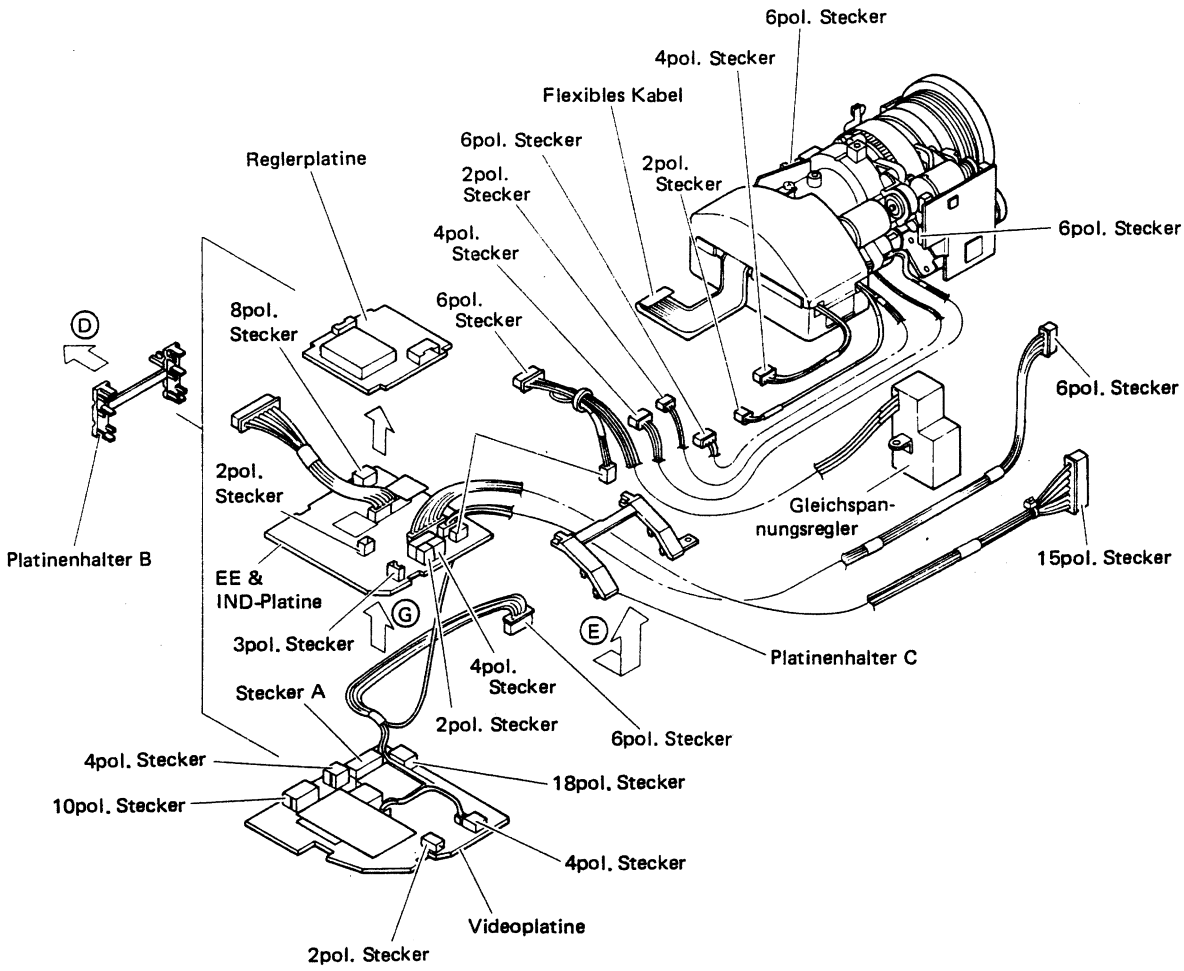


Abb. 1-2-3

1. 3 AUSBAU DES BILDSENSORS

1. 3. 1 Vorsichtsmaßnahmen

1. Der CCD-Bildsensor ist in noch stärkerem Maße als C-MOS-Elemente elektrostatischem Zusammenbruch ausgesetzt. Bei Aufbewahrung, Handhabung und Lötarbeiten muß daher entsprechended Sorgfalt gezeigt werden.
2. Die Frontseite des CCD-Bildsensors vor Verunreingungen, Kratzern, Fingerabdrücken etc. schützen. Verunreinigungen vorsichtig mit einem Silicon-Linsenreinigungstuch, Putzleder etc. entfernen.
3. Ab Werk ist der CCD-Bildsensor mit einem orangefarbenen Schutzsiegel versehen. Dieses Siegel erst unmittelbar vor der Montage in den optischen Block entfernen.
4. Bei Lötarbeiten zügig vorangehen. Durch zu hohe Hitzeeinwirkung kann der optische Filter des CCD-Bildsensors entfärbt werden.

1. 3. 2 Ausbau des CCD-Bildsensors

1. Unter Bezugnahme auf Abb. 1-3-1 die beiden Schrauben F lösen. Den optischen Block von der Bildwandlerplatine trennen.
2. Die drei Schrauben von Filterhalter C entfernen und den Filterhalter sowie Filter D und Gummidistanzstück E abnehmen.
3. Die beiden Schrauben A von Bildsensorhalter G entfernen.
4. Bildsensor H entlöten und abnehmen.

1. 3. 3 Einbau des CCD-Bildsensors

1. Das Schutzsiegel abnehmen und den CCD-Sensor am Bildsensorhalter G anbringen. Dann vor diesen Gummidistanzstück E, optischen Filter D und Filterhalter C anbringen. Sicherstellen, daß der CCD-Bildsensor in Bezug zur Bildwandlerplatine korrekt ausgerichtet ist. Ebenfalls überprüfen, ob die weiße Markierung des optischen Filters an der Unterseite vorne liegt. Den Filterhalter mit den drei Schrauben B am Bildsensorhalter befestigen.
2. Unter Beachtung der korrekten Ausrichtung den Bildsensorhalter mit den beiden Schrauben A am optischen Block befestigen.
3. Mit äußerster Sorgfalt die CCD-Bildsensor-Pins an der Bildwandlerrückseite in die Öffnungen an der Bildwandlerplatine einführen, dann die beiden Schrauben F eindrehen.
4. Nun die CCD-Bildsensor-Pins anlöten. Zu hohe Hitzeentwicklung vermeiden.

1. 3. 4 Einstellarbeiten

1. Rück-Focus-Einstellung.
2. Elektrische Einstellung ist nicht erforderlich.

Hinweis: Falls die Monitorabbildung nicht mittig ist, bzw. schräg verläuft, die beiden Schrauben (8) lösen und diesen Fehler durch Ausrichtung der Gesamt-Bildwandlerplatine korrigieren.

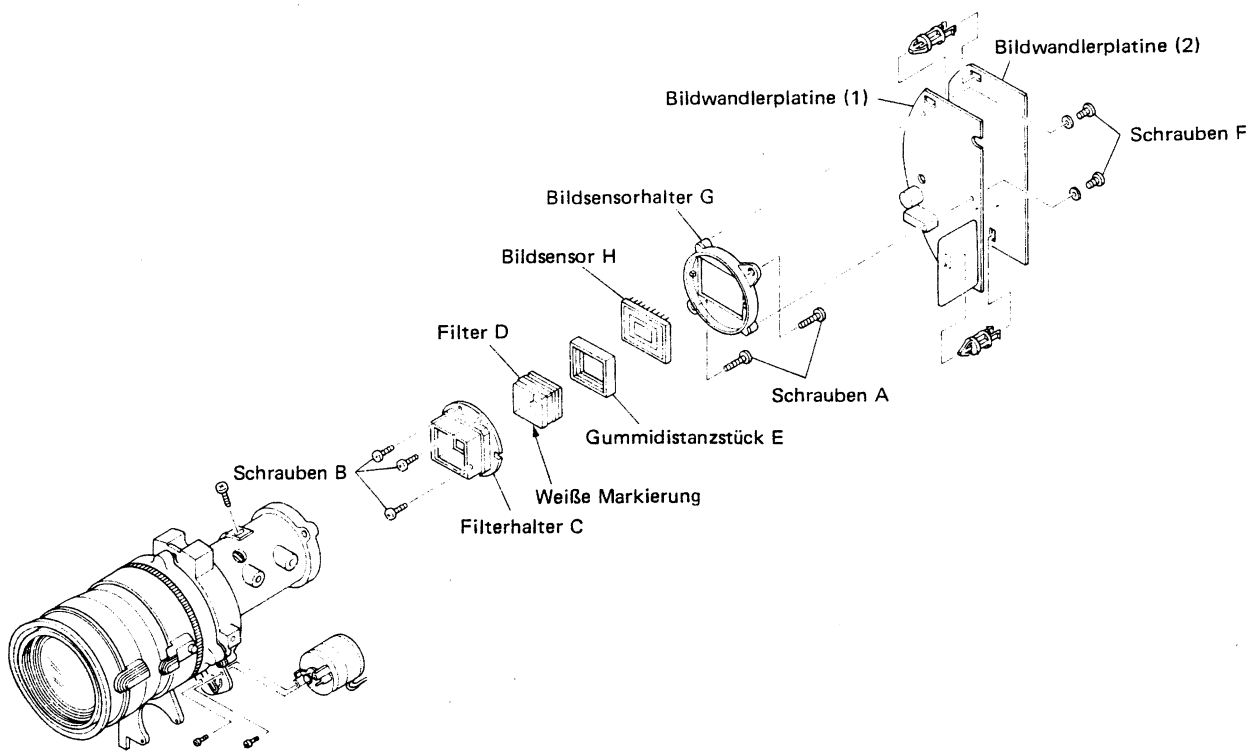
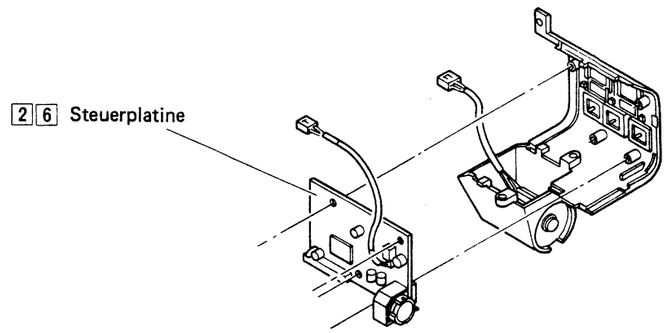
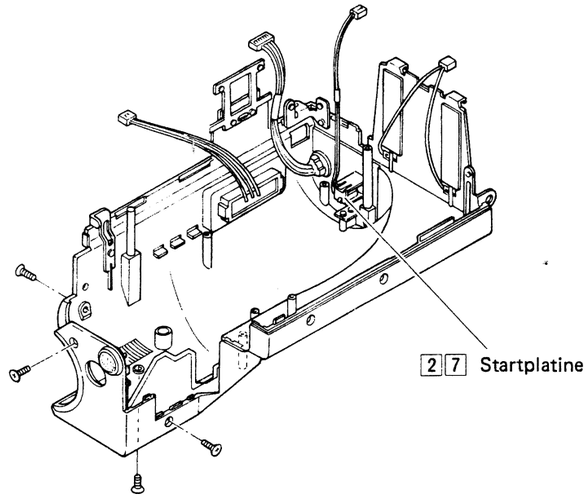


Abb. 1-3-1

1. 4 LAGE DER HAUPTKOMPONENTEN

1. 4. 1 Rekorder- und Kamerateilkomponenten (1)





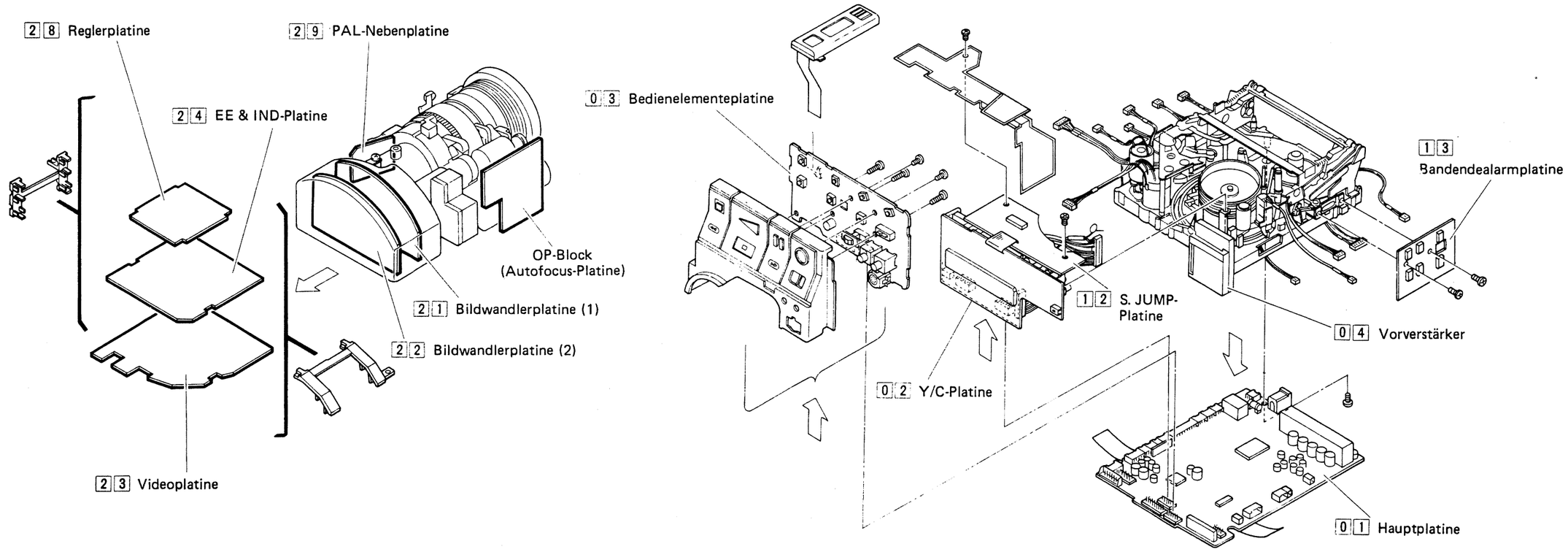


Abb. 1-4-1

1-7

1. 4. 2 Rekorder- und Kamerateilkomponenten (2)

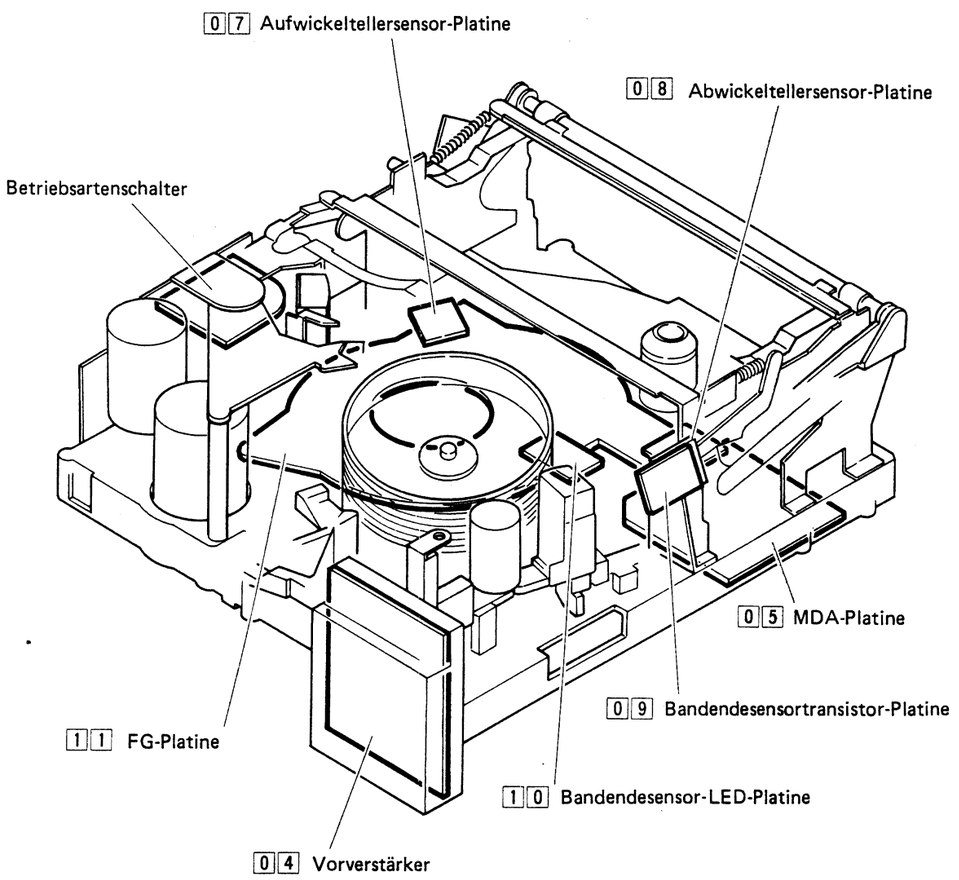


Abb. 1-4-2

1. 5 ALARM-BETRIEBSARTPRÜFLISTE

Die VideoMovie verfügt über Selbstdiagnosefunktionen, die Störungssuche und Kundendienstarbeiten erleichtern. Im Falle einer Fehlfunktion wird die Alarmbetriebsart automatisch vom Computer der Mechacon-Schaltung festgestellt. Die Betriebs-LED-Anzeigen geben die Störungsart über einen Anzeigecode wieder. Bei der Arbeit mit diesen Anzeigen sollten folgende Hinweise beachtet werden.

1. 5. 1 Alarmbetriebsartanzeige

Diese Übersicht zeigt mögliche Ursachen, Testpunkte und Normalbetrieb-Signalformen für Alarmbetriebsartanzeigen 1 bis 27. Bei Alarmbetriebsart die Kundendienst-Prüfarbeiten unter Berücksichtigung der Angaben in der Übersicht vornehmen.

Hinweis: Einige Abschnitte der Übersicht sind nicht für alle VideoMovie-Modelle verfügbar.

1. 5. 2 Kundendienstprüfliste (für Testbetriebsart)

Der Test-Betriebsartschalter ist ein Kundendienst-Meßapparat für Prüfarbeiten. Zum Start der Testbetriebsart wie folgt vorgehen.

1. Die VideoMovie-Spannungsversorgung abtrennen.
2. Den Test-Betriebsartschalter an CN10A der MAIN-Platine anschließen.
3. Eine bespielbare Kassette in die VideoMovie einlegen.
4. Den Test-Betriebsartschalter entsprechend der erforderlichen Codenummer der Kundendienstprüfliste einstellen.
5. Die VideoMovie mit Spannung versorgen.
   Pro Testbetriebsart wird ein Testvorgang durchgeführt. Um auf einen anderen Testvorgang zu schalten, die obigen Bedienschritte vornehmen (um den Computer rückzustellen). Der Testvorgang erfolgt bis zur Computer-Rückstellung (Spannungsversorgung ausschalten).

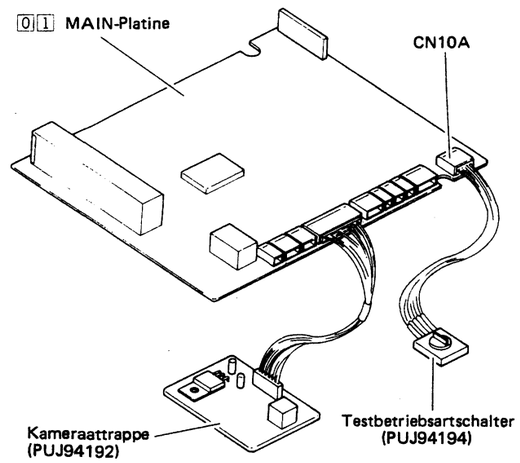


Fig. 1-5-1

1. 5. 3 Testbetriebsartanwendungen

Code 1
Dieser Test dient der Überprüfung der Bedienelemente-Abtastschaltung ohne Funktionsauslösung beim Gerät. Schalteranschluß/-betrieb und Schaltungsfunktionen können überprüft werden. Bei Normalbetrieb muß die entsprechende LED bei Betätigung des Bedienelements leuchten. Bei normalen Testanzeigen kann eine Störung dem Bereich außerhalb der Bedienelemente-Abtastschaltung zugeordnet werden.

Code 2
Die Überprüfung der elektrischen Schaltung ist auch ohne mechanische Funktionsauslösung möglich. Somit ist die Fehlerzuweisung für elektrisches oder mechanisches System möglich. Bei Betätigen der Bedienelemente wird die entsprechende Funktion elektrisch vorgenommen. Hierbei wird jedoch der Lademotor nicht aktiviert und der Mechanismum wird nicht ausgelöst.

Code 3
Bei Einschaltung der Spannungsversorgung startet dieser Test automatisch, um wiederholt Lade- und Entladevorgang durchzuführen. Eine bespielbare Kassette verwenden, da dieser Vorgang bei Aufnahmepause-Betriebsart erfolgt.

Code 4
Test für Umspulen vorwärts/rückwärts. Nach Einschalten der Spannungsversorgung erfolgt Stopbetrieb für ca. 90 Sekunden und dann Umschaltung auf Umspulen vorwärts.

Code 5
Wiedergabe (wiederholung)-Test.

Code 7
Überprüfung der Aufnahmeverriegelung und Leistungsrelais-Schaltungen. Mit Ausnahme der Aufnahmeverriegelung wird automatisch auf Stop geschaltet und die Leistungsrelais-Schaltung wird überprüft. Diesen Test für die Überprüfung der Spannungsversorgungs-Ein-/Ausschaltung verwenden.
Bei Aufnahmeverriegeluung (Abschaltung der Spannungsversorgung bei Aufnahmebetrieb) wird der Test automatisch bei Einschaltung vorgenommen.

Code 8
Schnellüberprüfungsfunktions-Test. Bei Aufnahmestart wird dieser Test 5mal durchgeführt und dann auf Aufnahme geschaltet. Bei Start von der Stop-Betriebsart muß die REC-Taste betätigt werden.

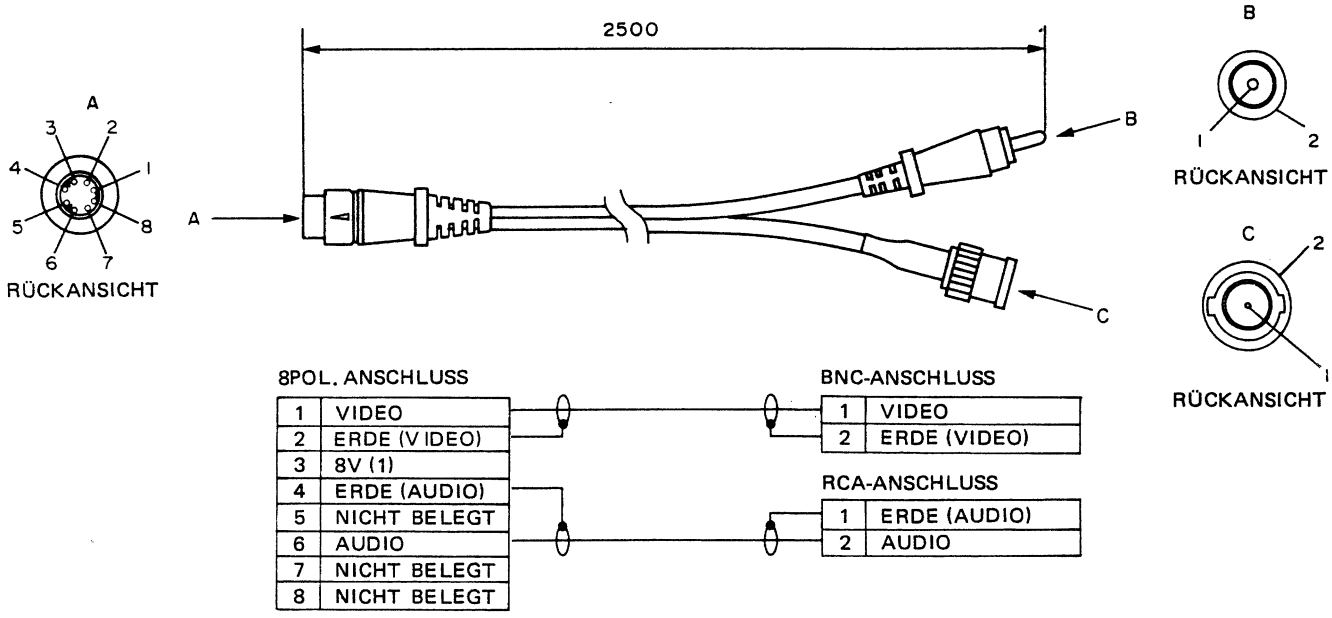
Code E
Schnellreparaturtest. Bei Abtastung einer Fehlfunktion wird auf Alarmbetriebsart geschaltet. Es wird auf Stop geschaltet, die Spannungsversorgung unterbrochen, die LED-Anzeigen geben eine Blinksignal. Es ist keine weitere Funktionsauslösung am Gerät möglich.
Dieser Test verhindert die Umschaltung auf die Alarmbetriebsart und erlaubt die Ursachensuche für die Fehlfunktion. Bei dieser Betriebsart werden die Sensoreingänge nicht registriert.

Code F
Normales Programm. Erlaubt normalen Programmbetrieb bei angeschlossenem Test-Betriebsartschalter.

1-8

1.6 FORM UND POLZUORDNUNG DER KABEL

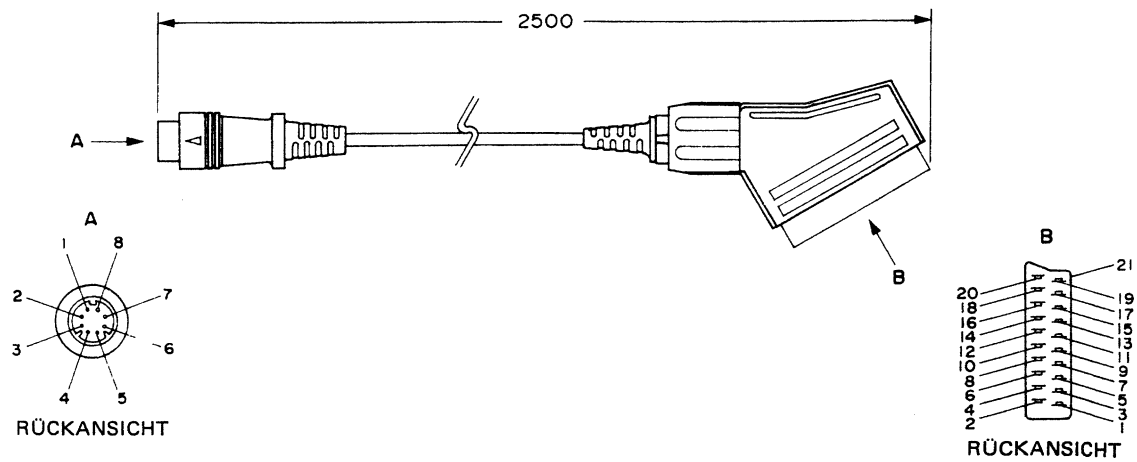
- **Audio/Video-Kabel**



8POL. ANSCHLUSS		BNC-ANSCHLUSS	
1	VIDEO	1	VIDEO
2	ERDE (VIDEO)	2	ERDE (VIDEO)
3	8V (1)		
4	ERDE (AUDIO)	RCA-ANSCHLUSS	
5	NICHT BELEGT	1	ERDE (AUDIO)
6	AUDIO	2	AUDIO
7	NICHT BELEGT		
8	NICHT BELEGT		

Abb. 1-6-1

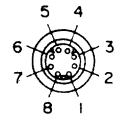
- **21pol./8pol.**
  Adapterkabel

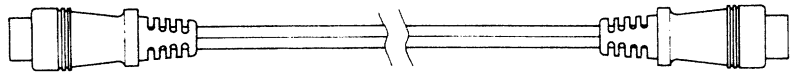


8POL. ANSCHLUSS		21POL. PERIANSCHLUSS	
1	VIDEO	1	NICHT BELEGT
2	ERDE (VIDEO)	2	NICHT BELEGT
3	8V(1)	3	NICHT BELEGT
4	ERDE (AUDIO)	4	ERDE (AUDIO)
5	NICHT BELEGT	5	NICHT BELEGT
6	AUDIO	6	AUDIO
7	NICHT BELEGT	7	NICHT BELEGT
8	NICHT BELEGT	8	8V(1)
		17	ERDE (VIDEO)
		18	NICHT BELEGT
		19	NICHT BELEGT
		20	VIDEO
		21	NICHT BELEGT

Abb. 1-6-2

- **Audio/Video-Verlängerungskabel (VC-P2U)**

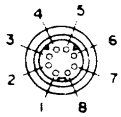


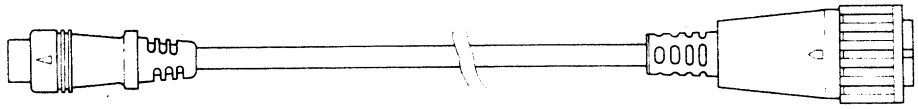


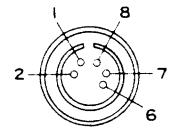
8POL. ANSCHLUSS		8POL. ANSCHLUSS	
1	VIDEO	1	VIDEO
2	ERDE (VIDEO)	2	ERDE (VIDEO)
3	8V (1)	3	8V(1)
4	ERDE (AUDIO)	4	ERDE (AUDIO)
5	NICHT BELEGT	5	NICHT BELEGT
6	AUDIO	6	AUDIO
7	NICHT BELEGT	7	NICHT BELEGT
8	NICHT BELEGT	8	NICHT BELEGT

Abb. 1-6-3

- **8pol./10pol. Adapterkabel (VC-V810U)**







8POL. ANSCHLUSS		10POL. ANSCHLUSS	
1	VIDEO-AUSGANG	1	VIDEO
2	ERDE	2	ERDE
3	NICHT BELEGT	3	NICHT BELEGT
4	NICHT BELEGT	4	NICHT BELEGT
5	FERNBEDIENUNG-AUSGANG	5	NICHT BELEGT
6	AUDIO-AUSGANG	6	KAMERA-PAUSE
7	NICHT BELEGT	7	AUDIO-EINGANG
8	NICHT BELEGT	8	ERDE
		9	NICHT BELEGT
		10	NICHT BELEGT

4.7K
1.5K

Abb. 1-6-4

1. 7 BAND-ZÄHLWERKDISPLAY UND BANDLAUFZEIT

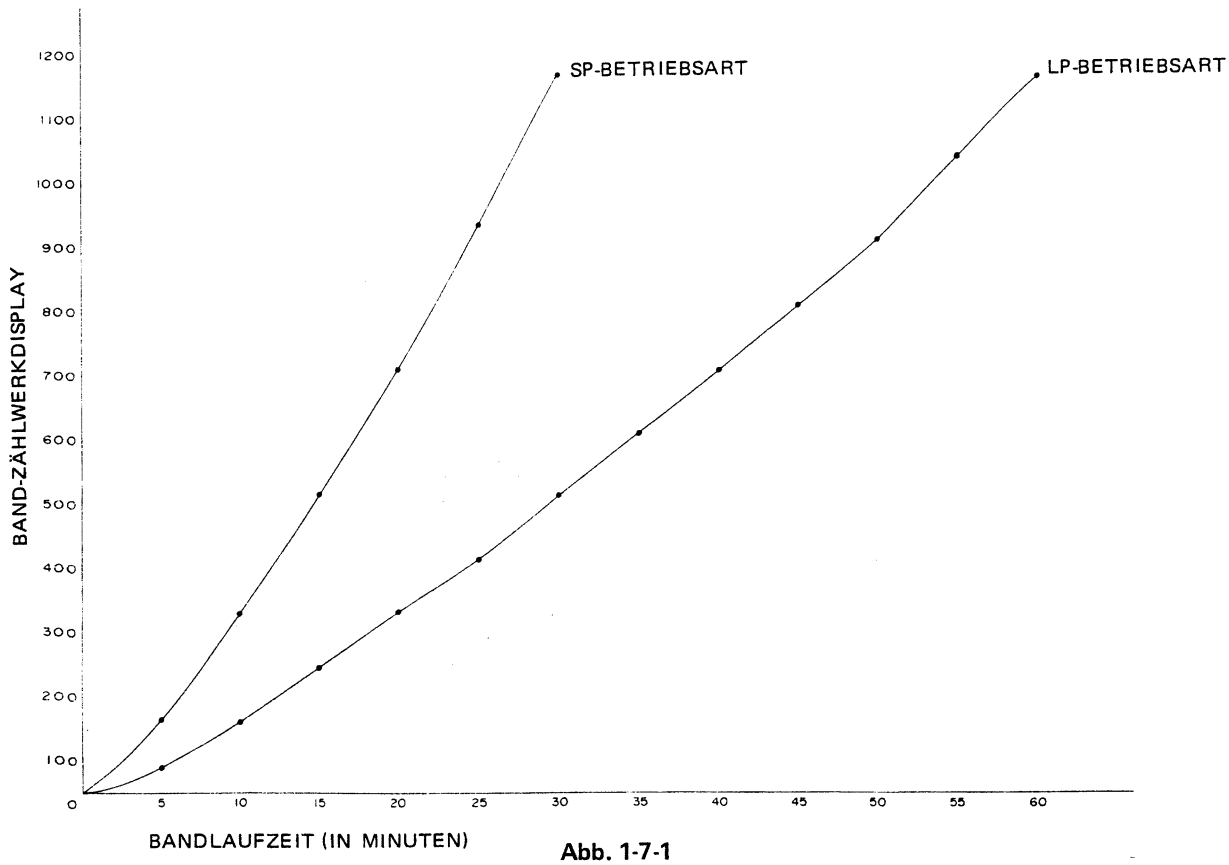


Abb. 1-7-1

ABSCHNITT 2
EINSTELLUNG DER MECHANIK

2.1 ALLGEMEINE HINWEISE

1. Dieser Abschnitt behandelt den Austausch von Verschleißteilen der Mechanik und Reparaturarbeiten.
2. Vorsichtig vorgehen, da mechanische und elektrische Einstellungen miteinander im Zusammenhang stehen. In einigen Fällen sind mechanische Einstellungen Voraussetzung für elektrische Einstellungen.
3. Um einen Ladevorgang ohne eingelegte Kassette durchzuführen, den Bandendesensor mit schwarzem Klebeband abdecken und die Kassettenschalterkontakte abdecken. Um einen Ladevorgang durchzuführen, die Tellerscheibe per Hand drehen (der Entladevorgang erfolgt bei Umdrehungsstop der Tellerscheibe).

2.2 ERFORDERLICHE EINSTELLEHREN, WERKZEUGE UND MESSGERÄTE

1. Tabelle 2-1 zeigt die für dieses Modell erforderliche Arbeitsausrüstung.
2. Zusätzlich werden die folgenden Meßgeräte und Werkzeuge benötigt.
   - Korrekt eingestellter TV-Farbmonitor
   - Oszilloskop, Breitband, Zweikanal, mit verzögerter Zeitbasis
   - Steckschlüssel (Zollmaße inkl. 0,135 Zoll = 0,89 mm)
   - Kassette (für Probelauf und -aufnahme)
   - Präzisions-Schraubendreher

   Siehe auch Abschnitt "Elektrische Einstellungen".

Hinweis: Meßgeräte und Werkzeuge für elektrische Einstellungen siehe den entsprechenden Abschnitt.

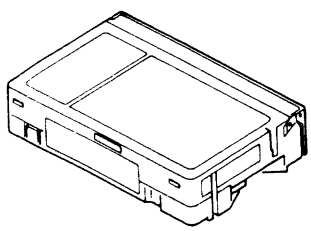
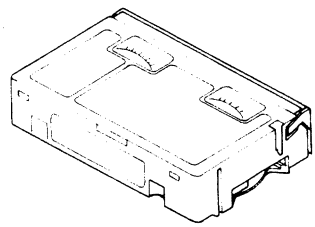
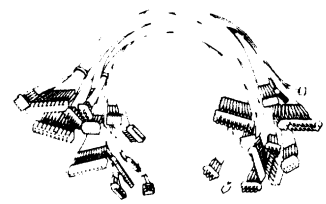
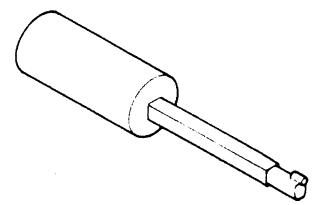
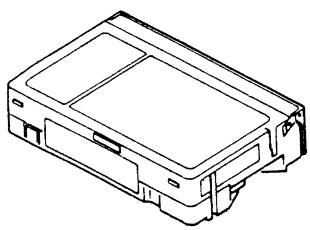
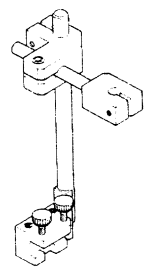
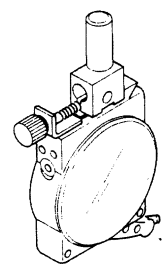
Abgleichband MH-C2	Bandzug-Meßkassette PUJ43637	Verlängerungskabelsatz PUJ93991	Audio-/Synchronkopf-Ausrichtwerkzeug PUJ94196
			
Testkassette CH-C5L	**Zentrierlehrenhalter PUJ94195**	**Zentrierlehre PUJ96016**	
			

Tabelle 2-1 Werkzeuge, Einstellehren und Meßgeräte

2. 3 LAGE DER HAUPTKOMPONENTEN

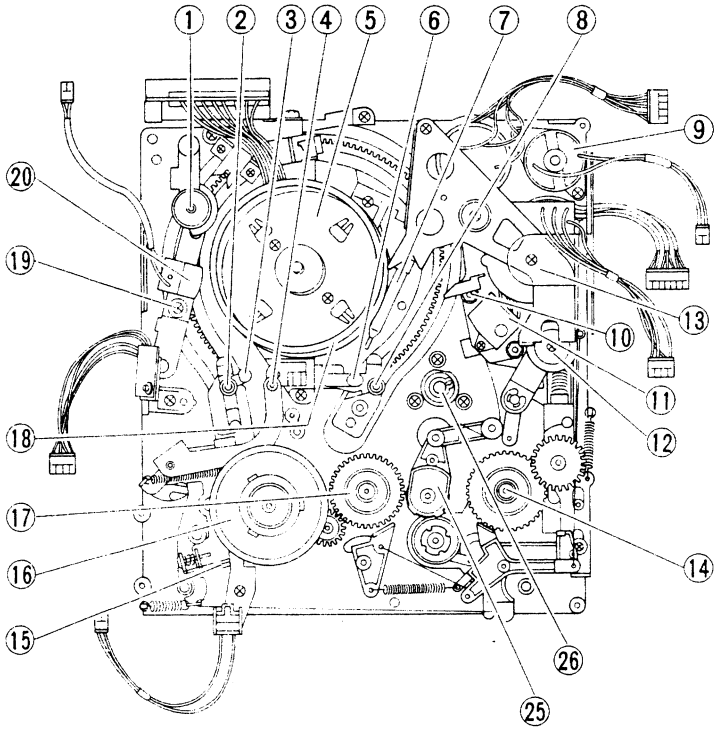


Abb. 2-1-1 Draufsicht

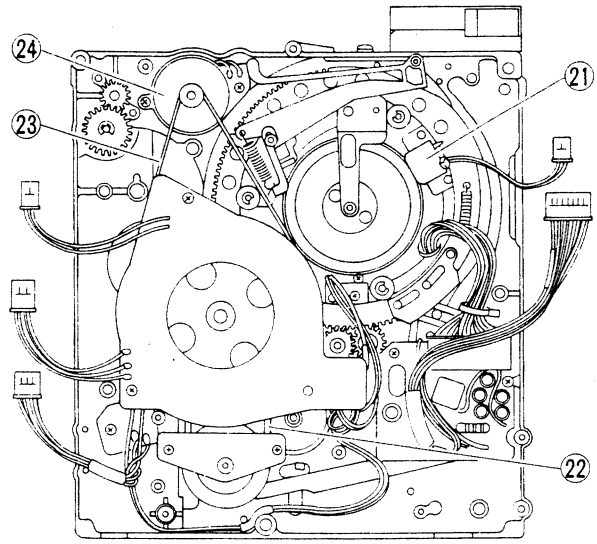


Abb. 2-1-2 Unteransicht

1 Spannrolle
2 Abwickelführungsrolle
3 Schrägführungsbolzen (Abwickelführung)
4 Bandzugfühlhebel
5 Trommel
6 Schrägführungsbolzen (Aufwickelführung)
7 Mittelhebel
8 Aufwickelführungsrolle
9 Lademotor
10 Aufwickelführungsbolzen (2)
11 Audio/Synchronkopf
12 Andruckrolle
13 Kurvenscheibenschalter
14 Aufwickelkupplung
15 Bremsband
16 Abwickelteller
17 Abwickelkupplung
18 Kopftrommelmotor
19 Abwickelführungsbolzen
20 Gesamtlöschkopf
21 Impulskopf
22 Wickelantriebsriemen
23 Capstanantriebsriemen
24 Capstanmotor
25 Antriebsradarm
26 Capstan

2.4 AUSTAUSCH DER HAUPTKOMPONENTEN

Wie für den Austausch erforderlich, Außenabdeckungen, Platinen, Abschirmungen und den Kassettenhalter entfernen.

2.4.1 Kassettenhalter

1. Die vier Halteschrauben des Kassettenhalters entfernen und den Kassettenhalter austauschen. Nach dem Austausch sorgfältig mehrere Male die wesentlichen Bandtransportfunktionen, inkl. Einlegen und Entnehmen der Kassette sowie Umspulen vorwärts/rückwärts überprüfen. Sicherstellen, daß keine zu starken mechanischen Geräusche auftreten und daß das Band nicht beschädigt ist.

2.4.2 Wickelteller

1. Sprengring und Wickelteller abnehmen. Auf die Unterlegscheibe an der Tellerunterseite achten.
2. Den Wickelschaft mit Alkohol reinigen und leicht einölen.
3. Einen neuen Wickelteller montieren und die Bandzugmessung (Abschnitt 2.5.5) vornehmen.

2.4.3 Bremsband

1. Den Wickelteller abnehmen.
2. Auf die komprimierte Feder achten und eine Schraube und Unterlegscheibe entfernen.
3. Die Feder lösen und das Bremsband austauschen.
4. Das neue Bremsband und den Wickelteller anbringen.
5. Die Position des Bandzugfühlhebels einstellen und eine Bandzugmessung (Abschnitt 2.5.5) vornehmen.

2.4.4 Capstanmotor

1. Nach Austausch des Capstanmotors Einstellarbeiten zur Capstanabstastposition durchführen.

2.4.5 Kopftrommeleinheit

Oberer und unterer Kopftrommelteil und der Vorverstärker dieses Geräts sind ab Werk aufeinander optimal abgestimmt. Daher sollte stets die gesamte Kopftrommeleinheit ausgetauscht werden (der Vorverstärker ist auf die Videoköpfe abgestimmt).

Falls ein Austausch des oberen Kopftrommelteils unumgänglich ist, wie folgt vorgehen.

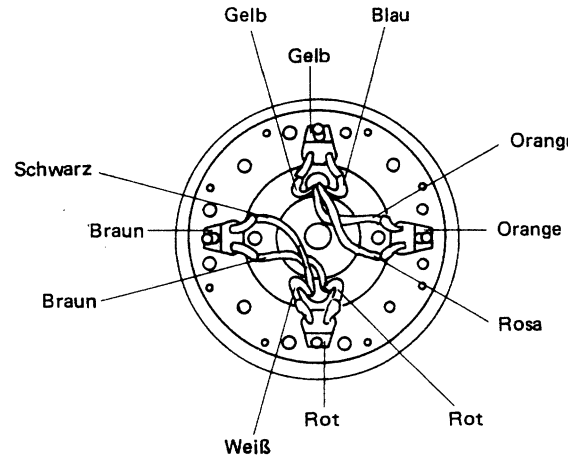


Abb. 2-2

1. Die Drähte von den Relaisstiften der Kopftrommel entlöten. Die beiden Schrauben entfernen und die Kopftrommel nach oben abnehmen.
2. Bei Einsetzen der neuen Kopftrommel sorgfältig darauf achten, nicht die Kopf-Kontaktflächen zu berühren oder die Trommel zu verkratzen.
3. Nach komplettem Austausch unter Bezugnahme auf Abschnitt 2.6 Prüf- und Abgleicharbeiten für Bandtransport, Servoschaltung, Aufnahme- und Wiedergabefarbpegel sowie FM-Aufnahmepegel vornehmen.

   Den Vorverstärker ebenfalls einstellen.

Hinweis: Bei LP-Betrieb aufnehmen und wiedergeben. Bei starker Jitterstörung die Kopftrommelschrauben lösen und die Kopftrommel neu ausrichten. Dann die Schrauben wieder anziehen.

2.4.6 Audio/Synchronkopf

1. Ohne eingelegte Kassette einen Ladevorgang durchführen. Sofort nach komplettem Ladevorgang die Spannungsversorgung abschalten.
2. Anschluß CN13 von der MAIN-Platine (Servobereich) trennen.
3. Die drei Halteschrauben des Audio/Synchronkopfes lösen. Den Kopf zusammen mit der Blattfeder abnehmen.
4. Die Drähte vom Audio/Synchronkopf entlöten und diesen austauschen.
5. Die Drähte korrekt am neuen Kopf anlöten.
6. Nach dem Austausch die Kopfneigung einstellen (siehe Abschnitt 2.7.2).
7. Die Prüf- und Einstellarbeiten zur Kompabilität von Abschnitt 2.7.3 durchführen.

Hinweis: Um einen Ladevorgang ohne eingelegte Kassette durchzuführen, die Auswurftaste betätigen, den Bandendesensor abdecken und die PLAY-Taste betätigen.

2.4.7 Gesamtlöschkopf

1. Der Gesamlöschkopf wird ohne Ausbau des Abwickelführungsbolzens ausgetauscht.
2. Sprengring und Feder entfernen, dann den Rollenarm nach oben abnehmen.
3. Den Löschkopfarm vorsichtig nach außen drücken und die Schraube an der Unterseite entfernen. Den Gesamtlöschkopf vom Arm abnehmen.
4. Den neuen Gesamtlöschkopf korrekt anbringen. Eine Kassette einlegen und den Bandlauf um den Abwickelführungsbolzen überprüfen.
5. Wenn das Band abknickt oder knittert, die Einstellarbeiten zur Höhenausrichtung des Abwickelführungsbolzens und Kompatibilitätseinstellungen durchführen (Abschnitt 2.6.1 und 2.7.1).

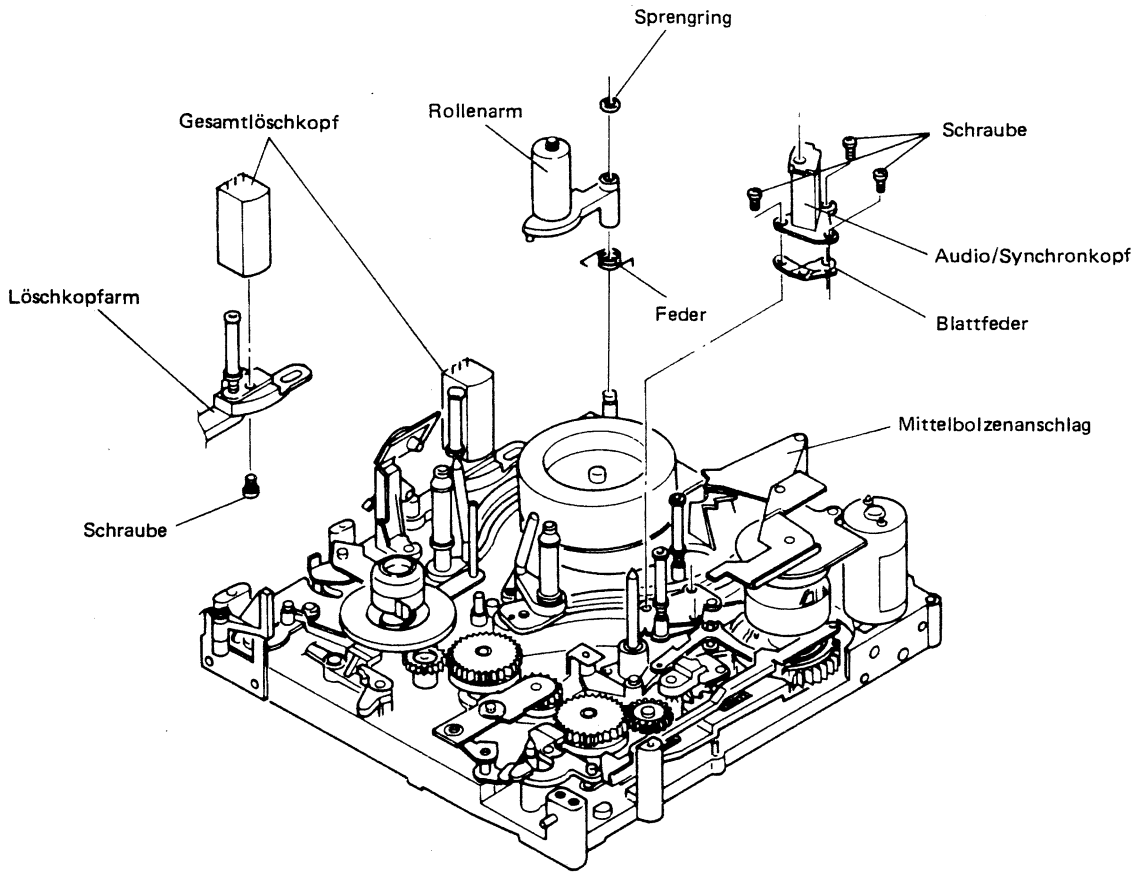


Abb. 2-3 Audio/Synchronkopf und Gesamtlöschkopf

2.5 MESSUNGEN UND EINSTELLUNGEN

Nach Zusammenbau der folgenden Teile unbedingt auf einwandfreies Zusammenwirken prüfen.

2.5.1 Lademotorschalter

1. Bei Stopbetriebsart muß der Lademotorschalter die in Abb. 2-4 gezeigte Position vorweisen.

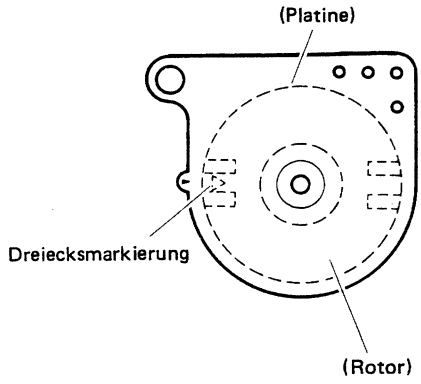


Abb. 2-4 Lademotorschalter

2.5.2 Andruckrollenarm

1. Bei Stopbetrieb muß die Teileausrichtung, insbesonders die Eingreifposition der Verzahnung von Andruckrollenarm und Andruckrollenstab, wie in Abb. 2-5 gezeigt, vorliegen.

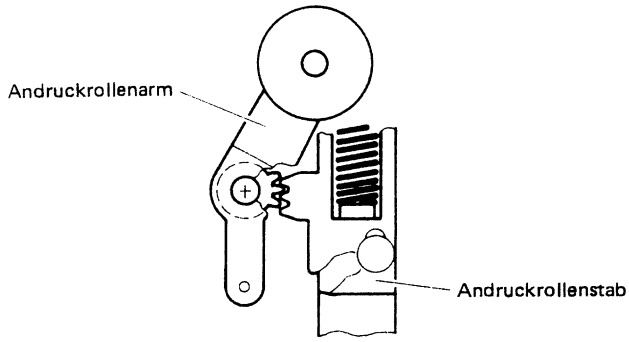


Abb. 2-5 Andruckrollenarm

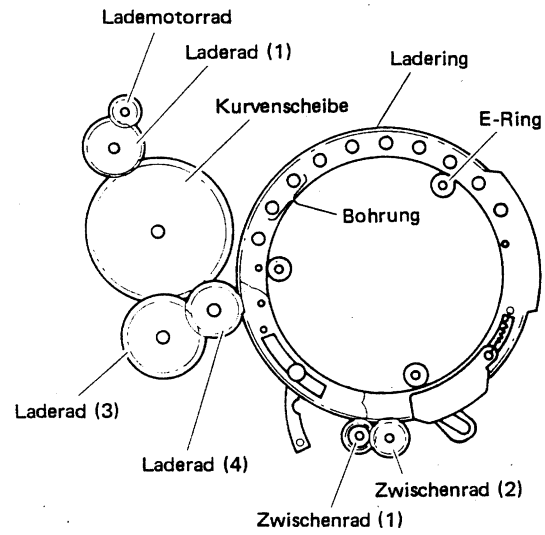


Abb. 2-6 Ladering (3)

2.5.3 Laderad und Ladering

Vor Austausch oder Ausbau von Laderad oder Laderingkomponenten auf die mechanische Stopbetriebsart schalten.

1. Aufwickel- und Abwickelladeringe in die Entladerichtung drehen, so daß zweite und dritte Bohrung sowie Verzahnung von Aufwickel- und Abwickelladering gefluchtet sind. Keinen zu starken Druck ausüben.
2. Die Ringe bei dieser Ausrichtung anbringen. Hier kann der Arbeitsvorgang erleichtert werden, wenn einer der drei E-Ringe zunächst komplett befestigt wird (siehe Abb. 2-6).

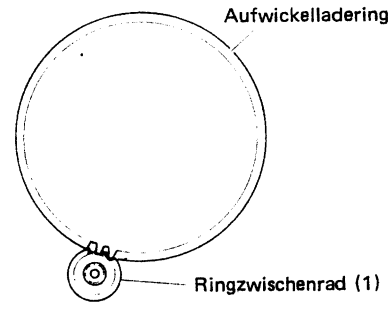


Abb. 2-7 Ladering

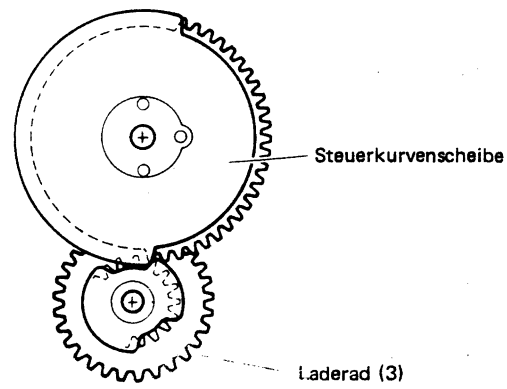


Abb. 2-8 Laderad (3)

3. Das Ringzwischenrad (1) wie in Abb. 2-7 gezeigt anbringen.
4. Ringzwischenrad (2) anbringen. Falls der Einbau behindert wird, den Entladering etwas im Uhrzeigersinn drehen, um den Einbau zu ermöglichen.
5. Die Steuerkurvenscheibe auf die Stopbetriebsposition (siehe Abb. 2-4) einstellen. Die größere Backe von Laderad (3) auf den Ladering ausrichten. Sicherstellen, daß das Ende der kleineren Backe Kontakt zur Kante der Backe der Steuerkurvenscheibe, wie in Abb. 2-8 gezeigt, hat. Falls erforderlich, den Lademotor etwas im Uhrzeigersinn drehen, um den Einbau des Laderings (3) zu erleichtern.
6. Laderad (4) so einbauen, daß dessen Verzahnung bei Laderad (3) und Aufwickelladering eingerastet ist (siehe Abb. 2-6).
   Hierbei muß die markierte Verzahnung von Laderad (4) ungefähr bei der 3-Uhr-Position stehen und gleichmäßig beim Aufwickelladerad eingerastet sein.
7. Den Lade-/Entladevorgang mehrmals wiederholen. Sicherstellen, daß die markierte Verzahnung von Laderad (4) korrekt auf den Ladering ausgerichtet ist und der mechanische Ablauf einwandfrei ist.
8. Bei gestörtem mechanischen Ablauf nochmals den Zusammenbau vornehmen. Hierbei nicht Laderad (1) beschädigen.

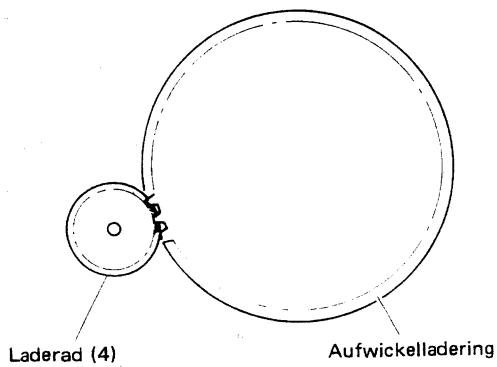


Abb. 2-9 Laderad (4)

2. 5. 4 Mittelbolzen

1. Während des Ladevorgangs, vom Zeitpunkt, wenn der Sockel des Aufwickelbolzens den Mittelbolzen passiert bis er mit der V-Kerbe der Kopftrommelbasis Kontakt hat, sicherstellen, daß der Mittelbolzen symmetrisch in der Kerbe des Mittelbolzenanschlags ruht.
2. Nach komplettem Ladevorgang auf Bandtransport schalten. Sicherstellen, daß das Band nicht zwischen der V-Kerbe der Kopftrommelbasis und der Führungsrolle eingeklemmt wird.
3. Beim Entladevorgang darf der Bolzensockel den Mittelbolzen nicht berühren.
4. Bei Lade- und Entladevorgang den Ablauf von Bolzensockel und Mittelbolzen beobachten und sicherstellen, daß das Band nicht lose läuft und keine anderen Fehlfunktionen auftreten. Es darf ebenfalls keine Beschädigung der Bandkante bei Umwickelung der Kopftrommel auftreten.

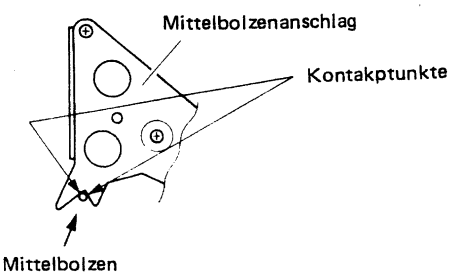


Abb. 2-10 Mittelbolzenanschlag

2. 5. 5 Ausrichtung des Bandzugfühlhebels

1. Eine Kassette von Bandanfang bis ca. Bandmitte wiedergeben.
2. Wie in Abb. 2-11 gezeigt, sind am Gesamtlöschkopfarm drei Linienmarkierungen vorhanden. Schraube ① so drehen, daß die Kante des Bandzugfühlhebels genau auf die äußerste Linie ausgerichtet ist. Durch Drehen der Schraube im Uhrzeigersinn wird der Bandzugfühlhebel in Richtung A, durch Drehen gegen den Uhrzeigersinn in Richtung B bewegt.
3. Die Bandzugmeßkassette einlegen, und auf Wiedergabe schalten. Die rechte Anzeige gibt den Aufwickelzung, die linke Anzeige den Bandzug an. Die Anzeige muß rechts bei 40 bis 75 g/cm und links bei 15 bis 24 g/cm liegen. Wenn diese Werte nicht eingehalten werden, die Position des Bandzugfühlhebels überprüfen und falls erforderlich das Bremsband austauschen (Abschnitt 2. 4. 3). Bei großen Abweichungen kann ein Austausch des Wickeltellers (Abschnitt 2. 4. 2) erforderlich sein.
4. Nach der Einstellung die Kassette entnehmen und Schraube ① versiegeln.

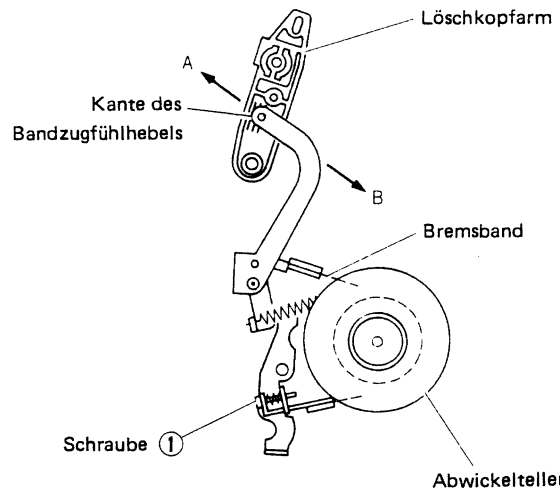


Abb. 2-11 Bandzugfühlhebel

2.6 MESSUNGEN UND EINSTELLUNGEN AM BANDTRANSPORTSYSTEM

Das Bandtransportsystem wurde ab Werk präzis eingestellt. Im Normalfall sind Nachjustierungen nicht erforderlich. Nur bei starker Abnutzung und bei Teiletausch im Bandsystem sind die folgenden Arbeiten erforderlich.

2.6.1 Führungsrollen

Die Höheneinstellung der Führungsrollen ist erforderlich, um bei Bandeinlauf und -auslauf während Kompatibilitätseinstellungen eine lineare FM-Signalform zu erhalten. Zur Höheneinstellung die Einstellschrauben (0,89 mm Steckschlüssel) lösen und die Führungsrolle mit einem Steckschlüssel (2,5 mm) drehen.

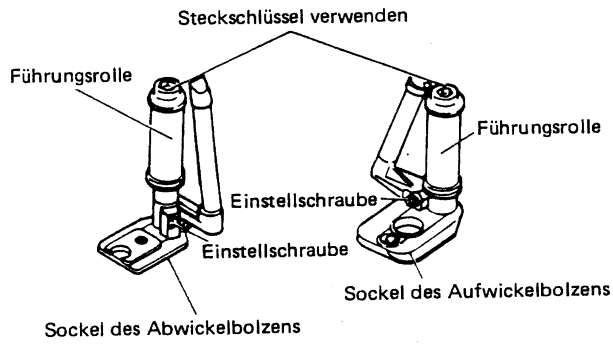


Abb. 2-12 Führungsrolle

Eine Kassette einlegen und den Bandlauf bei Bandeinlauf und entlang der Trommelführung beobachten. Bei auftretenden Bandlaufbeeinträchtigungen die Höhe der Abwickel-Führungsrolle verstellen.

Den Bandlauf bei Bandauslauf überprüfen und erforderlichenfalls die Höhe der Aufwickel-Führungsrolle einstellen.

2.6.2 Abwickelführungsbolzen

Dieser Führungsbolzen dient der Bandlaufstabilisierung zwischen Kassettenausgang und Bandeinlauf, da dieser für die Einhaltung der erforderlichen Bandhöhe sorgt.

Nach Einstellung der Abwickelführungsrolle kann durch Einstellung dieses Bolzens einwandfreiter Bandlauf am unteren Flansch des Führungsbolzens eingestellt werden.

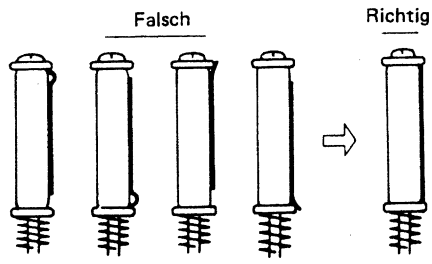


Abb. 2-13 Führungsbolzen

2.6.3 Neigung des Audio/Synchronkopfes (Aufwickelführungsbolzen)

Dies ist eine wesentliche Kompatibilitätseinstellung. Nach Einstellung der Aufwickelführungsrolle den Bandlauf am unteren Flansch des Aufwickelführungsbolzens überprüfen. Mit einem Kreuzschlitzschraubendreher Schraube Ⓑ gegen den Uhrzeigersinn drehen, bis am unteren Flansch Bandverwerfungen auftreten.
Dann in kleinen Schritten Schraube Ⓑ im Uhrzeigersinn drehen, bis keine Bandverwerfungen mehr wahrnehmbar sind.
Azimut und Höhe des Audio/Synchronkopfes werden bei Kompatibilitätseinstellungen justiert.

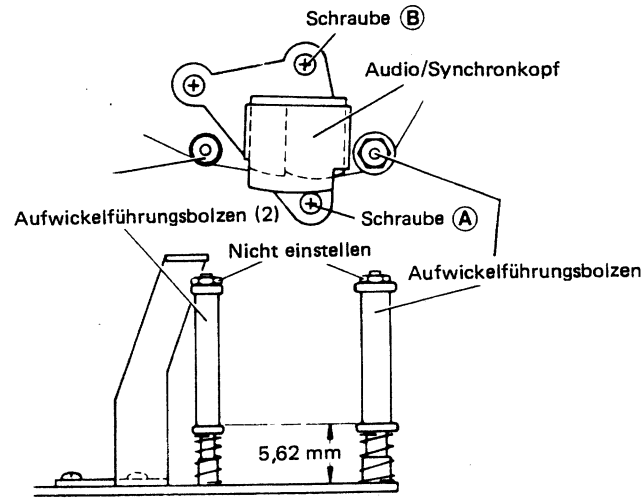


Abb. 2-14 Audio/Synchronkopf

2.7 ÜBERPRÜFUNG UND EINSTELLUNG DER KOMPATIBILITÄT

Vor dem Einlegen der Abgleichkassette den Bandlauf mit einer normalen Kassette überprüfen. Bei auftretenden Bandlaufstörungen deren Ursache beseitigen.

2.7.1 FM-Hüllkurve

Zur Überprüfung und Einstellung der FM-Hüllkurve dient das Grautreppensignal von Abgleichband MH-C2. An TP13 der Y/C-Platine ein Oszilloskop anschließen und dieses extern mit dem Signal von TP11 der Y/C-Platine triggern.

1. Abgleichband MH-C2 abspielen und die Spurlage auf maximalen FM-Ausgang einstellen. Zwischen Maximalausgang (a), Minmalausgang in Trommelmitte (b), Bandeinlauf (c) und Bandlauslauf (d) muß folgendes Pegelverhältnis bestehen:

$$\frac{b}{a} \geqq 0{,}7 \quad \frac{c}{a} \geqq 0{,}5 \text{ und } \frac{d}{a} \geqq 0{,}5$$

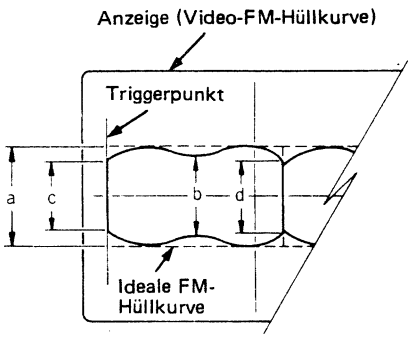


Abb. 2-15 FM-Hüllkurve

2. Mit dem Spurlageregler die FM-Hüllkurve zwischen Maximum und Minimum und umgekehrt variieren. Die Hüllkurve für den Bandeinlauf beobachten. Falls die Pegelvariierung nicht parallel, sondern in einem Sägezahnmuster erfolgt, ist eine Höheneinstellung der Abwickelführungsrolle erforderlich.

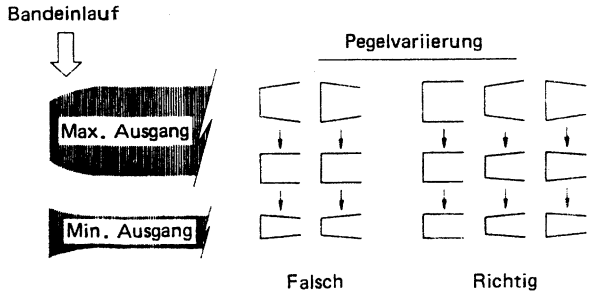


Abb. 2-16 Variierung der Eingangs-FM-Hüllkurve

Anders ausgedrückt: Der Bandlauf ist bei der Bandführung des Bandeinlaufs nicht einwandfrei. Die Höhe der Abwickelführungsrolle so einstellen, daß die Variation möglichst parallel vorliegt.

3. Entsprechend die FM-Hüllkurve für den Bandauslauf beobachten und gegebenenfalls die Höhe der Aufwickelführungsrolle einstellen, um die bestmögliche Parallelvariation zu erzielen.

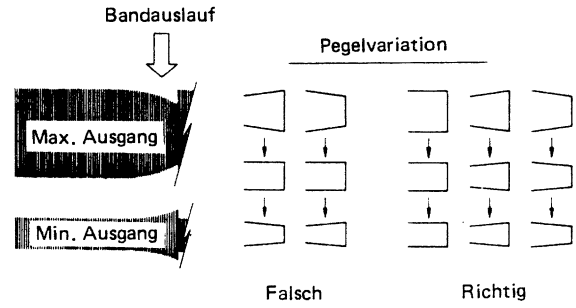


Abb. 2-17 Ausgangs-FM-Hüllkurve

4. Nun die gesamte FM-Hüllkurve überprüfen. Um die bestmögliche gesamte Parallelvariation zu erzielen, beide Führungsrollen vorsichtig einstellen.
5. Abgleichband MH-C5L abspielen und obigen Schritt 4. nochmals durchführen.
6. Das Band so einstellen, daß es bei Ladebetrieb, Umschalten von Rückspulen auf Wiedergabe und bei eingerastetem Bandzugfühlhebel nicht auf dem Flansch aufliegt.
   Falls beim Aufwickelführungsbolzen Verwerfungen oder Knittern festgestellt werden, die Neigung des Audio/Synchronkopfes einstellen und hierbei den Bandtransport am unteren Flansch des Führungsbolzens beobachten.

2.7.2 Einstellung des Audio/Synchronkopfes

Eine inkorrekte Position des Audio/Synchronkopfes kann ein beeinträchtigtes Ton-Signal/Rauschverhältnis zur Folge haben und in schwerwiegenden Fällen die Servostabilität vermindern, da das Steuersignal nicht mehr abgetastet werden kann.
Ein Oszilloskop an TP302 der MAIN-Platine oder direkt an den Audio-Ausgang anschließen und die Audiosignalform überprüfen.

1. Den Grautreppenabschnitt (Audio 6 kHz) von Abgleichband MH-C2 abspielen.
2. Durch Drehen von Schraube Ⓒ den Azimut auf maximalen Ausgang einstellen.
3. Die Schrauben Ⓐ , Ⓑ und Ⓒ um kleine und jeweils gleiche Beträge drehen (ca. 45°), um die Höhe auf maximalen Audioausgang einzustellen.

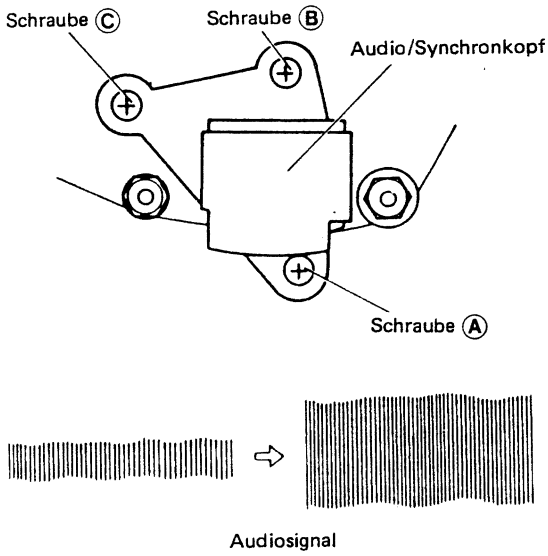


Abb. 2-18 Einstellung des Audio/Synchronkopfes

4. Nochmals die FM-Hüllkurve überprüfen. Bei zulässiger Anzeige die Einstellschrauben der Führungsrollen festziehen. Da hierdurch die FM-Hüllkurve beinflußt werden kann, diese nach dem Festziehen erneut überprüfen.

Hinweis: 2. 7. 1 und 2. 7. 2 sorgfältig (gleichzeitig) einstellen.

2.7.3 Steuerkopfphase

Erst nach Einstellung des monostabilen Multivibrators der SP/LP-Steuerverzögerung und der Spurlagevoreinstellung einstellen. Ein Oszilloskop an TP13 der Y/C-Platine anschließen und die FM-Hüllkurve überprüfen. Das Oszilloskop extern mit dem Signal von TP11 der Y/C-Platine triggern und auf negative Flanke schalten, um das CH1-Signal zu überprüfen. Den Spurlageregler auf seine einrastbare Mittelposition einstellen.

1. Das Grautreppensignal von Abgleichband MH-C2 abspielen.
2. Die Schrauben Ⓓ und Ⓔ des Audio/Synchronkopfes etwas lösen. Schraube Ⓓ mit dem Kopf-Ausrichtwerkzeug abdecken und den Stift des Werkzeugs in die Öffnung daneben einführen.
3. Das Werkzeug gegen den Uhrzeigersinn drehen, um den Audio/Synchronkopf bis zum Anschlag in Richtung des Capstans zu bewegen.
4. Das Werkzeug schrittweise im Uhrzeigersinn drehen und dabei die FM-Hüllkurve im Auge behalten. Bei Auftreten des ersten Hüllkurvenmaximums nicht mehr weiter drehen und Schraube Ⓔ festziehen. Dann Schraube Ⓓ festziehen.

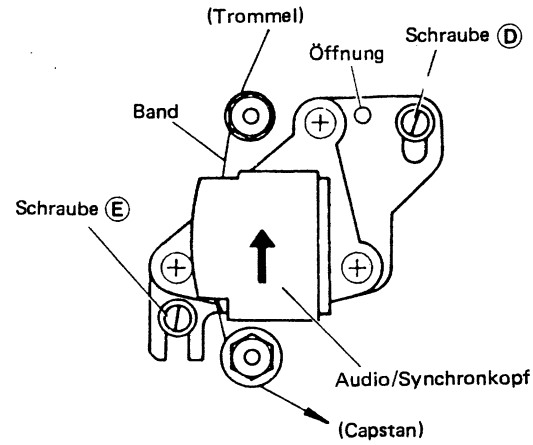


Abb. 2-19 Steuerkopfphase

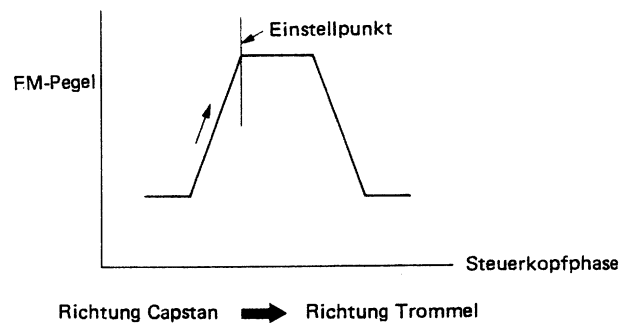


Abb. 2-20 Steuerkopfphase

5. Abgleichband CH-C5L abspielen und überprüfen, ob das FM-Hüllkurvenmaximum bei der einrastbaren Mittelposition des Spurlagereglers auftritt.

2.7.4 Endprüfung

1. Ein Video- oder TV-Eingangssignal anlegen, aufnehmen und wiedergeben. Sicherstellen, daß die FM-Hüllkurve den Vorgaben für SP- und LP-Betrieb entspricht.
2. Unter Bezugnahme auf die Angaben zu den elektrischen Einstellungen die Gesamtprüfarbeiten für Servo-, Video- und Audioschaltungen vornehmen.

2.8 ZENTRIERLEHRE

1. Die Zentrierlehre ist zur Einstellung der Kopftrommelzentrierung (innerhalb 2 Mikron Spiel) vorgesehen.
2. Vorsichtsmaßnahmen
   1) Da die Zentrierlehre ein Präzisionsinstrument ist, muß diese unbedingt vor Stößen und Vibrationen geschützt werden.
   2) Die Meßspitze stets mit größter Sorgfalt ohne Druckausübung bedienen.
   3) Der äußere Skalenring kann in einem Bereich von ca. 7 Skalenabschnitten gedreht werden. Diesen niemals gewaltsam (mit einer größeren Kraft als 300 gcm) drehen.
3. Aufbau (Siehe Abb. 2-8-1)

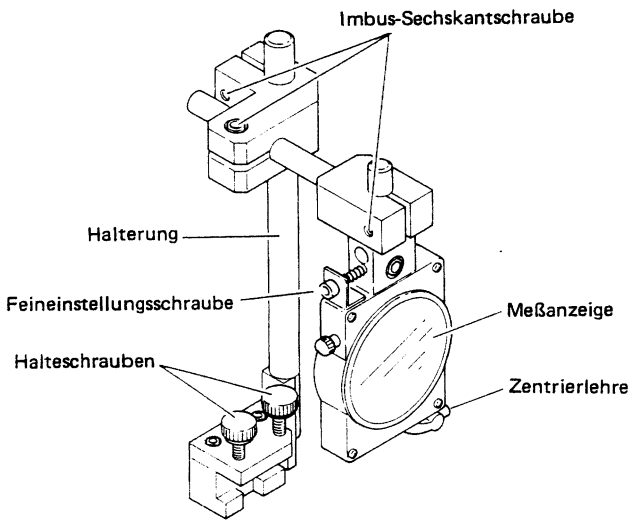


Abb. 2-8-1 Aufbau

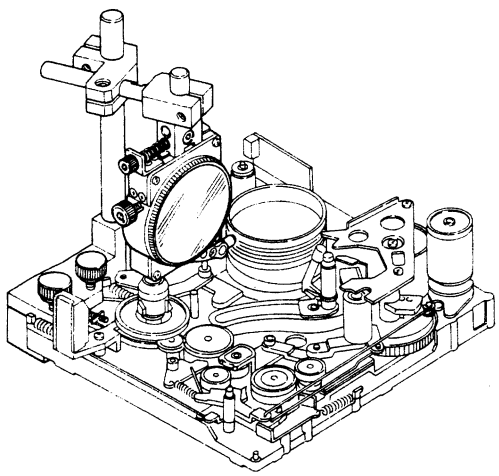


Abb. 2-8-2 Anbringung

4. Vorbereitung
   1) Bei eingerastetem Kassettenhalter einschalten. Die Wiedergabetaste betätigen und sorgfältig die Bewegung des Bolzensockels beobachten. Nochmals die Wiedergabetaste betätigen und die Spannungsversorgung in dem Moment unterbrechen, in dem der Abstand zwischen Bolzensockel und Kassettenhalter am größten ist (um die Zentrierlehre nicht zu behindern).
   2) Den Kassettenhalter ausbauen und die Kopftrommel reinigen.
   3) Die Feineinstellschraube der Zentrierlehre gegen den Uhrzeigersinn drehen.
   4) Die beiden Halteschrauben soweit lösen, so daß die Anbringung möglich ist, und die Zentrierlehre wie in Abb. 2-8-2 gezeigt am Chassis anbringen. Sicherstellen, daß der Halter im rechten Winkel zum Chassis steht. Unbedingt darauf achten, daß die Zentrierlehre (insbesonders die Prüfspitze) nicht die Videoköpfe berührt.

WICHTIG: Nach Anbringung der Zentrierlehre das Gerät auf keinen Fall einschalten!

   5) Die Position der Zentrierlehre überprüfen. Die Prüfspitze muß sich ca. 2 bis 5 mm unter der Oberkante der Kopftrommel befinden, ohne die Nut zu berühren. Die Prüfspitze muß gleichfalls auf die Trommelmitte, wie in Abb. 2-8-2 gezeigt, ausgerichtet sein. Gegebenenfalls die Imbusschrauben lösen und neu ausrichten.

5. Überprüfung auf Dezentrierung
   1) Die Feineinstellschraube im Uhrzeigersinn drehen, bis die Prüfspitze die Kopftrommel berührt. Den äußeren Skalenring auf einen leicht ablesbaren Wert (z.B. null) einstellen. Dieser Ring läßt sich im Bereich von ca. 7 Skaleneinheiten drehen.
   2) Die Kopftrommel vorsichtig ohne Druckausübung drehen (einen nicht kratzenden Gegenstand, wie Strohhalm oder Zahnstocher verwenden). Die angezeigte Abweichung darf in einem Bereich von 2 Mikron liegen.
   3) Bei einer Abweichung von über 2 Mikron muß die Kopftrommel neu zentriert werden.
   4) Die Feineinstellschraube drehen, um die Prüfspitze von der Kopftrommel abzusetzen. Die beiden Halteschrauben der Kopftrommel lösen und die Kopftrommelposition vorsichtig innerhalb der Schraubentoleranzen korrigieren. Dann die Schrauben wieder festziehen.
   5) Erneut die Zentrierung messen und gegebenenfalls wiederholen, bis die Dezentrierung auf den zulässigen 2-Mikronbereich reduziert ist.
6. Endprüfung
   1) Die Prüfspitze durch Drehen der Feineinstellschraube von der Kopftrommel absetzen und die Zentrierlehre abbauen.
   2) Kompatibilitäts- und Einstellarbeiten entsprechend dem Service-Handbuch vornehmen.

Hinweise:
1) PUJ94195 Zentrierlehre-Halter
2) PUJ96016 Zentrierlehre
3) Falls mit Zentrierlehre PUJ49712-2 gearbeitet werden soll, kann diese zusammen mit Zentrierlehre-Halter PUJ94915 verwendet werden.

ABSCHNITT 3
ELEKTRISCHE EINSTELLUNGEN

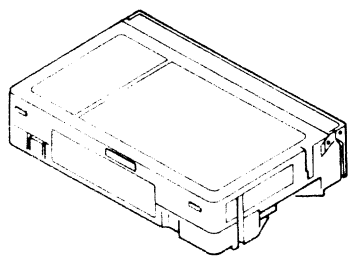
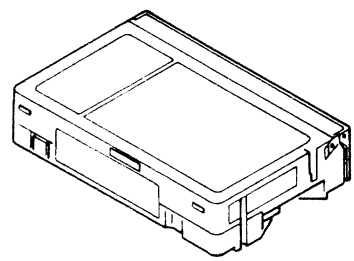
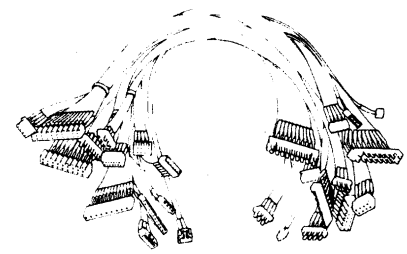
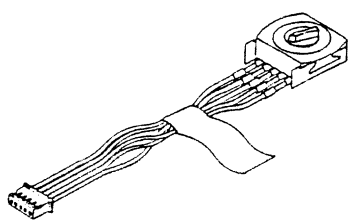
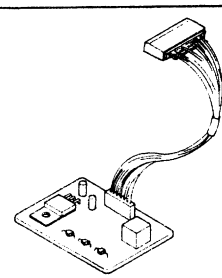
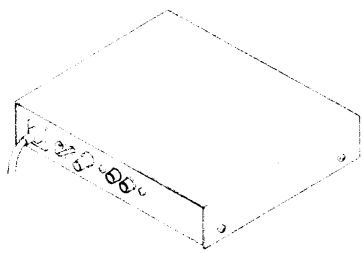
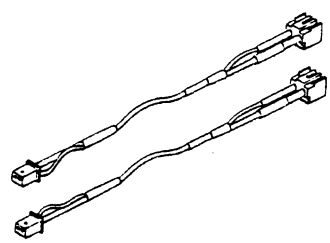
3. 1 ELEKTRISCHE EINSTELLUNGEN AM REKORDERTEIL

3. 1. 1 Vorsichtsmaßnahmen

Elektrische Einstellungen sind erforderlich, wenn mechanische Verschleißteile oder Videoköpfe ausgetauscht wurden, da zahlreiche elektrische Schaltungen miteinander in direktem Funktionszusammenhang stehen.
Bei Betriebsstörungen elektrische Einstellungen und Prüfarbeiten sorgfältig mit den erforderlichen, geeigneten Meßeinrichtungen durchführen.
Bei Außendienst-Kundendienstarbeiten ohne komplett verfügbare Ausrüstung keine unnötigen Änderungen des interenen Kontrollsystems verursachen. Solche Reparaturen und Einstellungen in einer autorisierten Kundendienstelle durchführen lassen oder den Werksservice beanspruchen.

3. 1. 2 Erforderliche Meßgeräte

1. Farbmonitor
2. Oszilloskop
3. Signalgenerator (PAL-Farbbalken, Grauskala)
4. Frequenzzähler
5. NF-Voltmeter
6. Regulierbare Gleichspannungsquelle
7. Digital-Voltmeter
8. Videokassette (EC-30) für Aufnahme- und Wiedergabetests
9. Abgleichband (MH-C2)
10. LP-Betriebsart-Testkassette (CH-C5L)
11. Verlängerungskabelsatz (PUJ93991B)
12. Kameraattrappe (PUJ94192)
13. Kundendienst-Meßapparat (PUJ94194)
14. Allgemein gebräuchliche elektrische/elektronische Werkzeuge

Abgleichband (SP-Betriebsart) MH-C2	Testband (LP-Betriebsart) CH-C5L	Verlängerungskabelsatz PUJ93991B
		
Kundendienst-Meßapparat PUJ 94194	Kameraattrappe PUJ94194	
		
Y/C-Separator PUJ25579-2	Y/C-Separatorkabel PUJ 94193	
		

• Diese Ausstattung ist nicht unbedingt für dieses Modell erforderlich.

Tabelle 3-1

3.1.3 Kameraattrappe

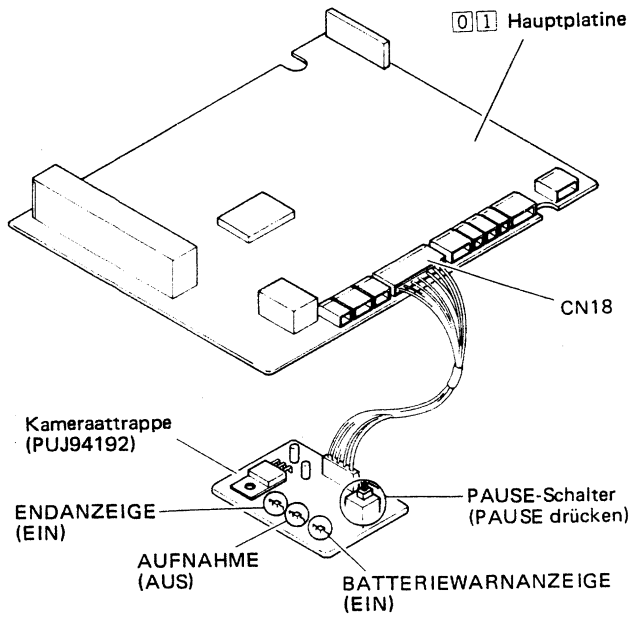


Abb. 3-1-1 Anschluß der Kameraattrappe

Kameraattrappe (PUJ94192) ist ein ausschließlich für den Gebrauch mit diesem Modell vorgesehenes Meßgerät, das bei Trennung von Rekorder- und Kamerateil der Video-Movie zum Einsatz kommt. Vor Gebrauch die Kameraattrappe an CN18 der Hauptplatine (01) mit dem Kabel anschließen.

- LED-Anzeigen und Schalter

LED FÜR BANDENDE-WARNUNG	: Leuchtet bei Bandende während Aufnahme
LED FÜR AUF-NAHMEBETRIEB	: Leuchtet außer bei Aufnahme
LED FÜR BATTERIE-WARNANZEIGE	: Leuchtet bei unzureichender Batterieleistung.
PAUSE-SCHALTER	: Bei gedrückter REC/REC PAUSE-Taste drücken, um auf Aufnahmepause zu schalten.

Hinweis: Bei nicht gedrücktem PAUSE-Schalter ist die PAUSE-Taste des Bedienfeldes ohne Funktion. Daher diese Attrappe bei gedrücktem PAUSE-Schalter verwenden, mit Ausnahme bei der Aufnahmebetriebsart.

3.1.4 Externes Videosignal (nicht von GR-C7)

(1) Da kein Eingang vorhanden ist, um externe Videosignale aufzeichnen zu können, kann das Verlängerungskabel PUJ93991B verwendet werden, das Y- und C-Videoeingangskabel besitzt. Das Videosignal direkt an CN1 (Y-Eingang) und CN2 (C-Eingang) der Y/C-Platine legen. Obwohl das E-E-Bild (Stop) beeinträchtigt sein kann, bleiben Aufnahme und Wiedergabe einwandfrei.

(2) Anschluß des Y/C-Sparators
(Nur für die E-E-Pegeleinstellung entsprechend dem Kameraeingang)

Das Gleichspannungsausgangskabel des Y/C-Separators an den GR-C7-Rekorderteil anschließen und an den Gleichspannnungseingang des Y/C-Separators 9,6 V Gleichspannung (von Netzadapter AA-V2 o.ä.) legen, wie in Abb. 3-1-2 gezeigt.
Hierauf die Kabel des Y/C-Separators wie unten gezeigt anschließen. Rotes Kabel an C OUT und weißes Kabel an Y OUT anschließen.
Dann das Kabel des Signalgenerators (Farbbalken) an den VIDEO IN-Eingang des Y/C-Separators anschließen.

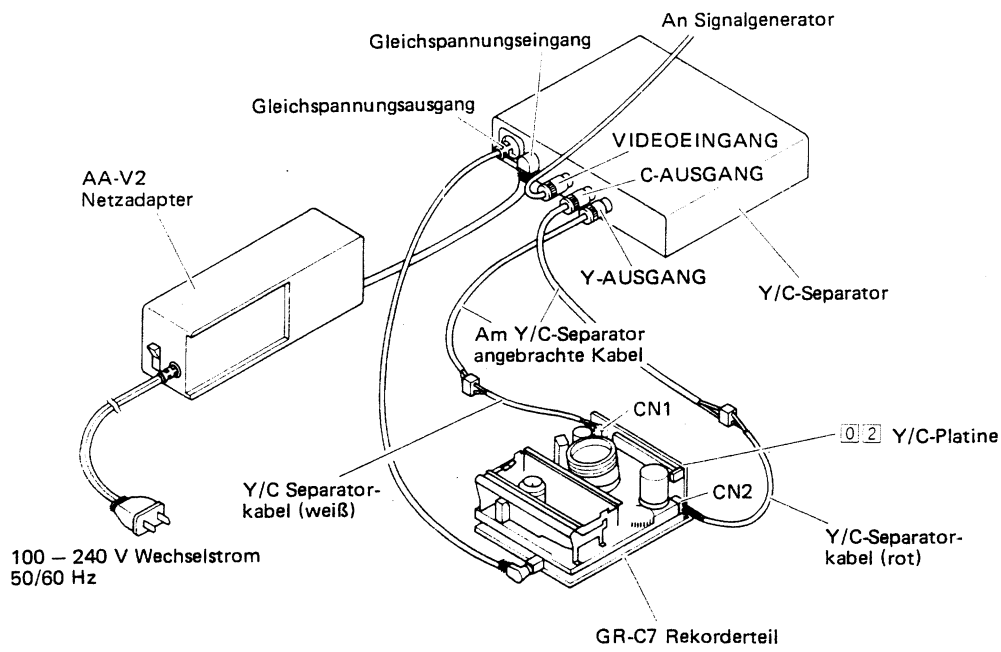


Abb. 3-1-2 Anschluß des Y/C-Separators

3. 1. 5 Lage der Abgleichpunkte

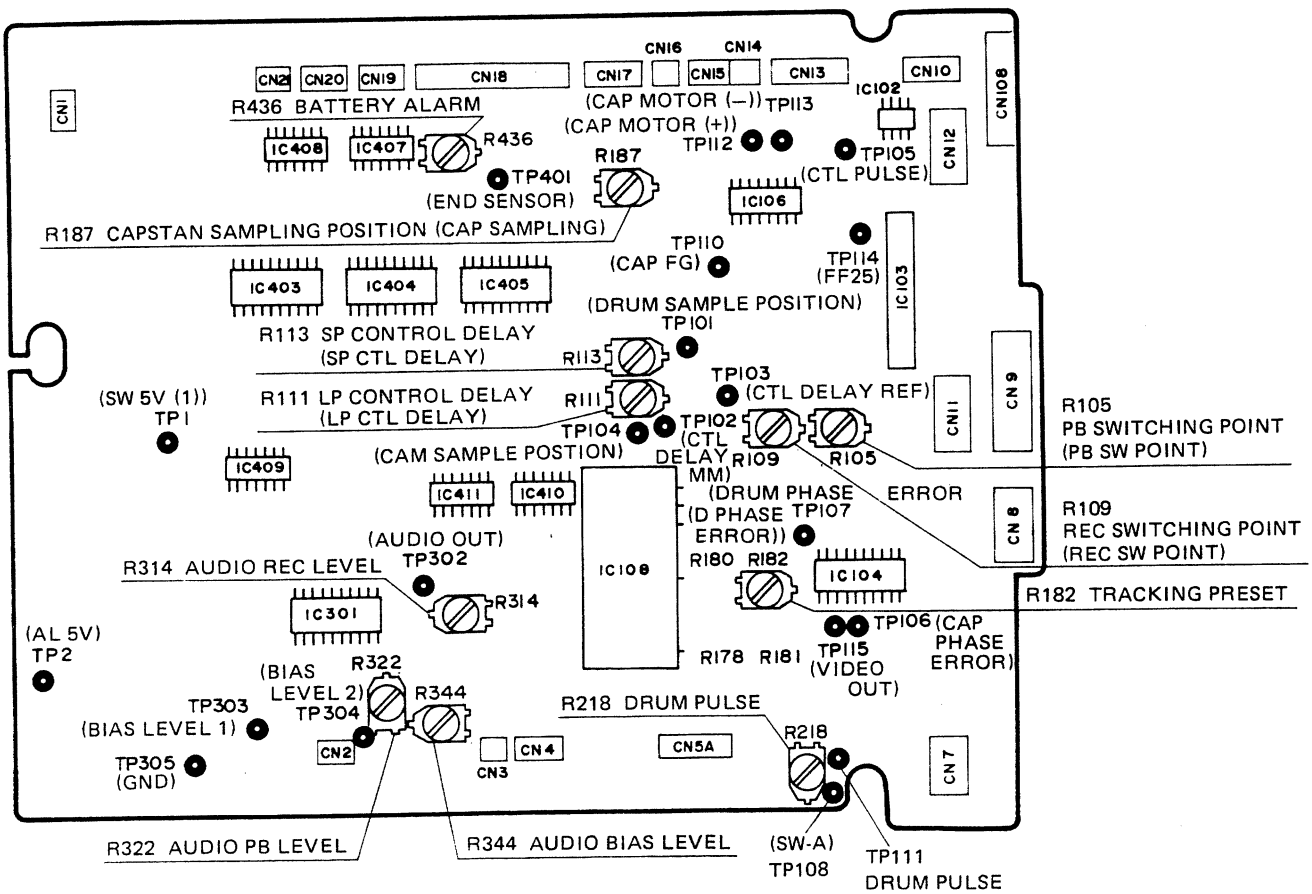


Abb. 3-1-3 [0] [1] Abgleichpunkte der Hauptplatine

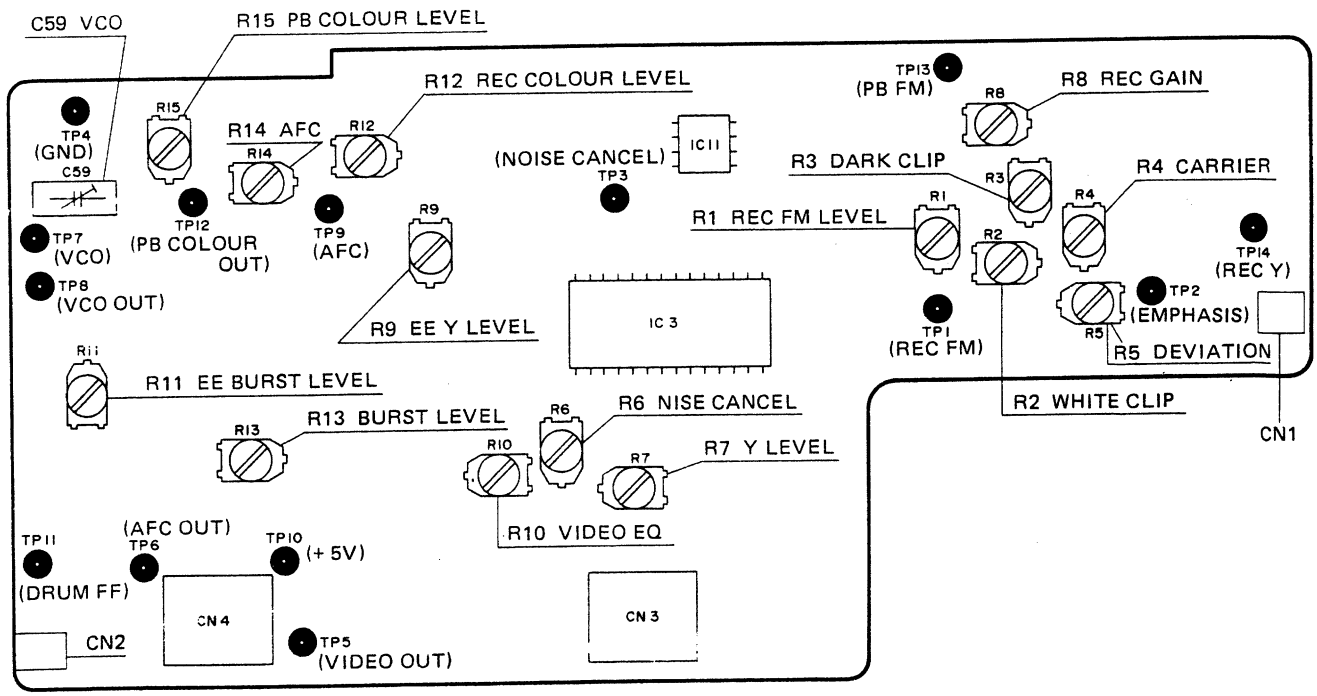


Abb. 3-1-4 [0] [2] Abgleichpunkte der Y/C-Platine

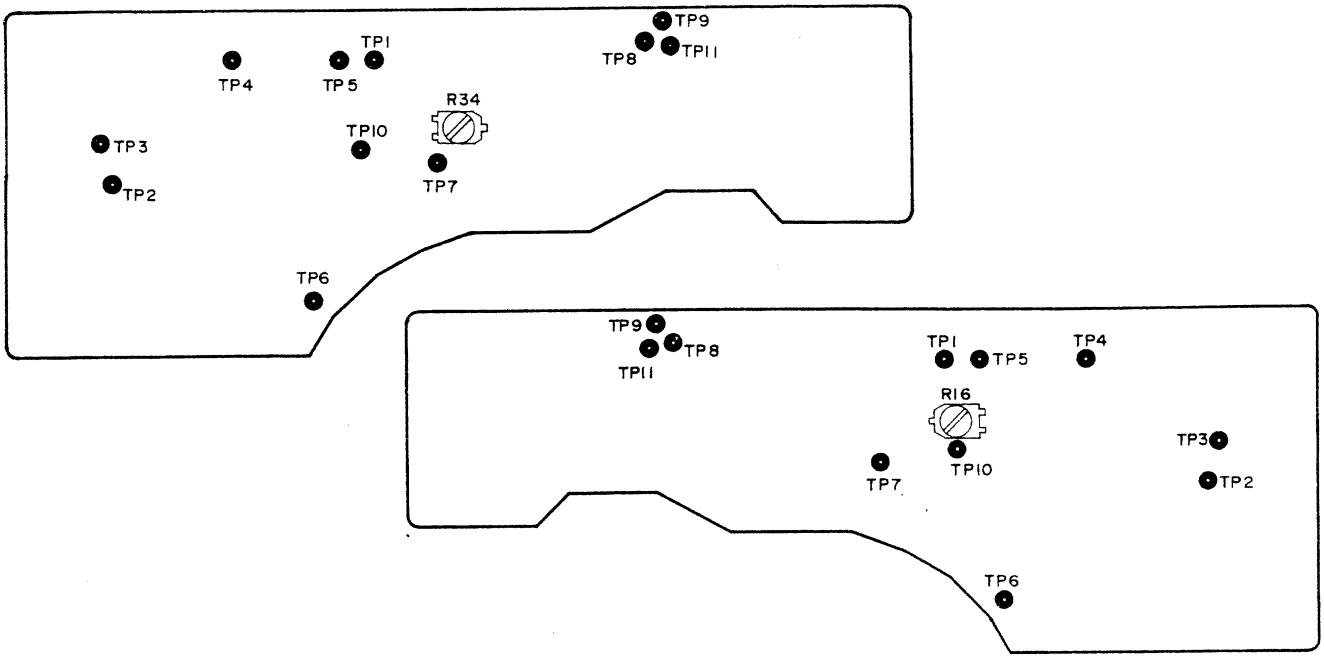


Abb. 3-1-5 [1] [2] Abgleichpunkte der S. JUMP-Platine

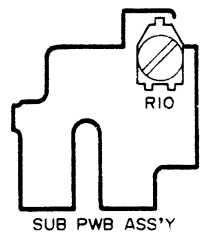


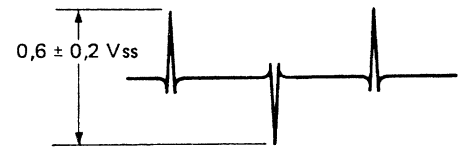
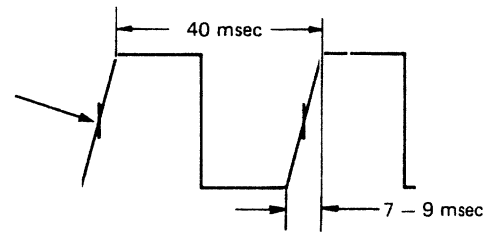
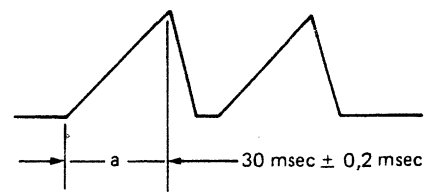
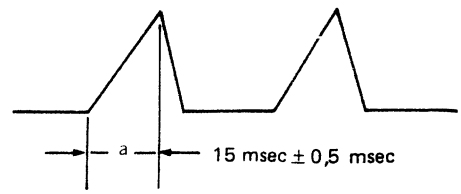
Abb. 3-1-6 Abgleichpunkt der SUB-Platine

3.2 NETZTEIL UND STEUERSCHALTUNG

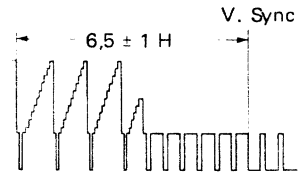
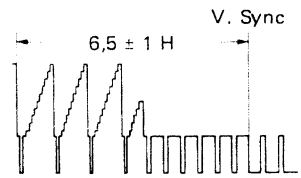
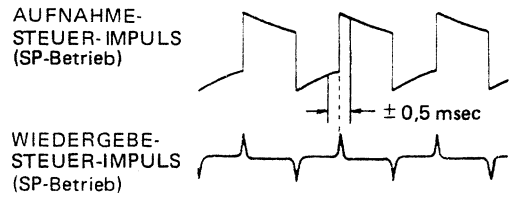
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
1	Batterie-warnanzeige	• Aufnahme • 9,2 V Gleichspannung an Batterie-anschluß • Batterie-anschluß	Pin 6 von IC404 [0] [1] MAIN Batteriewarnanzeige im LCD-Zählwerk	R436 [0] [1] MAIN	1) Bei Aufnahme an den Batterieanschluß 9,2 V Gleichspannung legen. 2) Ein Oszilloskop an Pin 6 von IC404 anschließen und R434 so einstellen, daß die Spannung von niedrig zu hoch wechselt. (Beim Wechsel tritt Oszillation auf). 3) Sicherstellen, daß die Batteriewarnanzeige im Bandzählwerk blinkt.
2	Batterie-Stop	• Aufnahme ohne Eingangssignal • 12 V → 8,8 ±0,1 V am BATT-Anschluß	Betriebsüberprüfung		1) Bei Aufnahmebetrieb wird die Spannungsversorgung unterbrochen, wenn die Spannung von 12 V auf 8,8 V ±0,1 V umgestellt wird.

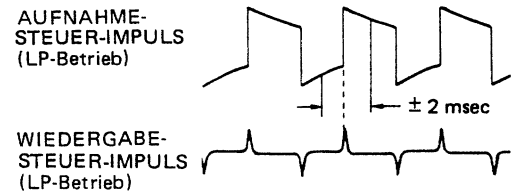
Hinweis: Wenn nicht anders angegeben, die Einstellarbeiten bei SP-Betrieb vornehmen.

3. 3 SERVOSCHALTUNG

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
1	Trommel-impuls	• Aufnahme	TP111 (DRUM PULSE) [0] [1] MAIN	R218 [0] [1] MAIN	1) Ein Oszilloskop an TP111 anschließen und R218 so einstellen, daß der Impuls (Abb. 3-3-1) bei 0,6 V ± 0,02 V liegt.  **Abb. 3-3-1**
2	Capstan-Abtast-position	• MH-C2 wieder-geben • Grau-skala	TP106 (CAP. PHASE ERROR) [0] [1] MAIN	R187 [0] [1] MAIN	1) Ein Digital-Voltmeter an TP106 anschließen und R187 auf 2,45 V ± 0,1 V einstellen. 2) Ein Oszilloskop an TP104 anschließen und sicher-stellen, daß ein stabiler Abtastimpuls um den mittleren Bereich der positiven Flanke des Trapezsignals vorliegt.  **Abb. 3-3-2**
3	Monostabiler MV für die LP-Steue-rungsver-zögerung	• E-E-Be-triebsart • LP-Be-triebsart • TP1 (SW5V(1)) TP103 (CTL DE-LAY REF) kurz-schließen	TP102 (CTL DELAY MMV) [0] [1] MAIN	R111 [0] [1] MAIN	1) TP1 und TP103 kurzschließen. 2) Ein Oszilloskop an TP102 anschließen und auf LP-Betrieb schalten. 3) Bei Stopbetrieb R111 so einstellen, daß (a) (die Periode zwischen Beginn der steigenden Flanke und Maximum) 30 msec. beträgt.  **Abb. 3-3-3**
4	Mono-stabiler MV für die SP-Steuerungs-verzögerung	• E-E • TP1 (SW5V(1) mit TP103 (CTL DE-LAY REF) kurz-schließen	TP102 (CTL DELAY MMV) [0] [1] MAIN	R113 [0] [1] MAIN	1) TP1 mit TP103 kurzschließen. 2) Ein Oszilloskop an TP102 anschließen und auf SP-Betrieb schalten. 3) Bei Stopbetrieb R113 so einstellen, daß (a) (Periode zwischen Beginn der steigenden Flanke und Maximum) 15 msec. beträgt.  **Abb. 3-3-4**

Hinweis: Bei Nichtgebrauch des Y/C-Separators zur Einstellung der Videoschaltung das Kamera-Videosignal verwenden.

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
5	Wiedergabeumschaltpunkt	• MH-C2 abspielen • Grauskala • Negative Flanke • Spurlageregler auf einrastbare Mittenposition	TP115 (VIDEO OUT) [0] [1] MAIN TP11 (FF25) EXT. TRIGGER [0] [2] Y/C	R105 [0] [1] MAIN	1) Das Oszilloskop an TP115 der [0] [1] MAIN-Platine anschließen und mit dem Signal von TP13 bei Wiedergabe von Abgleichband MH-C2 triggern. 2) Das Oszilloskop mit der negativen Flanke extern triggern. 3) R105 so einstellen, daß der Triggerpunkt 6,5 H vor V. Synchronimpuls liegt.  **Abb. 3-3-5**
6	Aufnahme-Umschaltpunkt	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) anlegen • Aufnahme • Negative Flanke • Spurlageregler in Mittenposition	TP115 (VIDEO OUT) [0] [1] MAIN TP12 (FF25) EXT TRIGGER [0] [1] MAIN	R109 [0] [1] MAIN	1) Bei Aufnahmebetrieb das Oszilloskop an TP115 anschließen und extern mit dem Signal von TP114 der [0] [1] MAIN-Platine triggern. 2) Das Oszilloskop mit der negativen Flanke extern triggern. 3) R109 so einstellen, daß der Triggerpunkt bei 6,5 ± 1 H vor V. Sync liegt.  **Abb. 3-3-6** 4) Die Aufzeichnung abspielen und sicherstellen, daß der Umschaltpunkt bei 6,5 ± 1 H liegt.
7	Spurlage-voreinstellung	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) anlegen • Eigene Aufnahme/Wiedergabe • Spurlageregler in Mittenposition	TP105 (CTL PULSE) [0] [1] MAIN TP11 (FF25) EXT. TRIGGER [0] [2] Y/C	R182 [0] [1] MAIN	1) Das Oszilloskop an TP105 anschließen und mit TP13 extern triggern. Dann auf Aufnahme schalten. 2) Die Aufzeichnung von (1) wiedergeben. R182 so einstellen, daß der Anfang der positiven Flanke von TP105 bei Aufnahme beim positiven Impuls von TP105 bei Wiedergabe liegt.  **Abb. 3-3-7 (a)**

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
		• LP-Betrieb			3) Für den LP-Betrieb die Bedienschritte 1) und 2) wiederholen, so daß die Signalform von Abb. 3-3-7 (b) vorliegt.  **Abb. 3-3-7 (b)**

3.4 Y/C- UND VORVERSTÄRKERSCHALTUNG

Hinweise:

- **Schritte 1 — 4 müssen nach Austausch der Videoköpfe und/oder des Vorverstärkers durchgeführt werden. Falls die Kopftrommeleinheit ausgetauscht wird, ist nur Schritt 1 (Videokopfresonanz und Güte) erforderlich (Einstellung ist nicht notwendig).**
- **Vor der Einstellung des Aufnahmesystems den E-E-Pegel einstellen.**
- **Vor der Einstellung von Träger und Frequenzhub das Wiedergabesystem einstellen.**
- **Die grundsätzliche Einstellfolge wird in Tabelle 3-4-1 gezeigt. Nur die erforderlichen Schritte durchführen.**

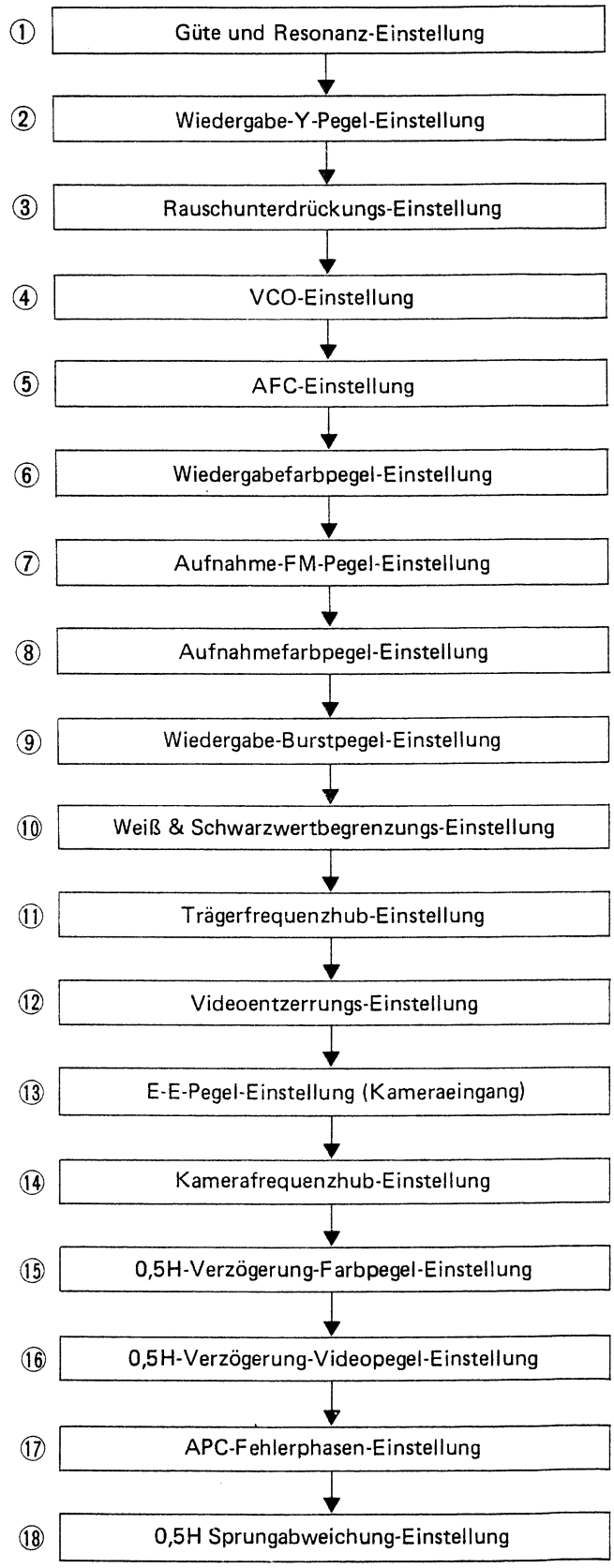
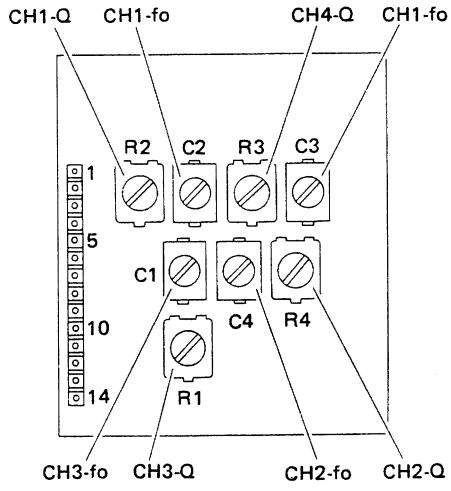
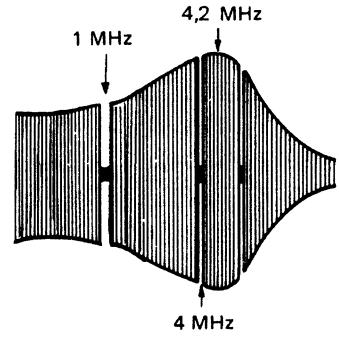
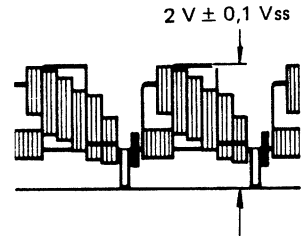
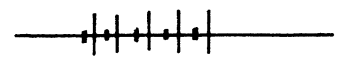


Tabelle 3-4-1 Grundsätzliche Einstellfolge für die Videoschaltung

[Y/C]

Nr	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
1	Resonanz und Güte	• Diese Einstellung ist nur erforderlich, wenn nach Austausch der Videoköpfe und/oder des Vorverstärkers bei der Wiedergabe/Aufnahme von Motiven mit starkem Kontrast Bildumkehrung oder horizontaler Jitter auftreten.			
		• MH-C2 • Wobbel-signal	TP6 (PB FM) [0] [2] Y/C	CH-1: C2(fo), R2(Q) CH-2: C4(fo), R4(Q) CH-3: C1(fo), R1(Q) CH-4: C3(fo), R3(Q) [0] [3] PRE AMP	1) Zur Erleichterung der Signalformüberwachung R2 (CH1 Q) auf maximalen Ausgang im 4,2-MHz-Bereich einstellen.. 2) Mit C2 (CH1 fo) den Resonanzpunkt auf 4,2 MHz einstellen. 3) Hier das Verhältnis zwischen 4,2 MHz und 1 MHz merken (Q-Wert).
					
					Abb. 3-4-1 Einstellbereich des Vorverstärkers
					Hinweis: Extern getriggert CH1 : Pin 4 CH2 : Pin 3 CH3 : Pin 7 CH4 : Pin 6 — von CN-7 der Hauptplatine
					
					Abb. 3-4-2
					4) Für CH2 bis CH4 Schritte 1) bis 3) wiederholen. 5) Entsprechend dem bei Schritt 3) gemerkten Verhältnis jede Resonanz auf die des jeweils schwächeren Kanals einstellen.
2	Wiedergabe-Y-Pegel	• MH-C2 abspielen • Farb-balken	TP5 (VIDEO OUT) [0] [2] Y/C	R7 [0] [2] Y/C	1) Das Oszilloskop an TP5 anschließen. R7 so einstellen, daß der Y-Pegel bei TP5 2 V ± 0,1 Vss beträgt.
					
					Abb. 3-4-3
3	Rausch-unter-drückung	• MH-C2 abspielen • Farb-balken	TP3 (NOISE CANCEL) [0] [2] Y/C	R6 (NOISE CANCEL) [0] [2] Y/C	1) Die Anzeige des an TP6 angeschlossenen Oszilloskops beachten, und mit R6 den Rauschpegel minimieren.
					
					Abb. 3-4-4
4	VCO-Einstel-lung (4,43 MHz)	• MH-C2 abspielen • Farb-balken	TP8 (VCO) [0] [2] Y/C	C59 [0] [2] Y/C	1) Zwischen TP4 (GND) und TP7 der Y/C-Platine einen 30-kOhm-Widerstand schalten. 2) Einen Frequenzzähler an TP8 anschließen und mit C59 die Frequenz auf 4,433619 MHz ± 50 kHz einstellen.

Nr	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
5	AFC	• MH-C2 abspielen • Farbbalken • 2,5 V Gleichstrom an TP10	TP6 (5,15 MHz) [0] [2] Y/C	R14 [0] [2] Y/C	1) An TP10 eine stabile Gleichspannung von 2,5 V legen (oder das in Abb. 3-4-5 gezeigte Meßinstrument an TP4,TP9 und TP6 anschließen). 2) Den Frequenzzähler an TP6 anschließen. 3) Mit R14 die Frequenz bei TP6 auf 5,15 MHz ± 100 kHz einstellen.
6	Wiedergabe-farbpegel	• MH-C2 abspielen • Farbbalken	TP12 (PB COLOR) [0] [2] Y/C	R15 [0] [2] Y/C	1) Das Oszilloskop anTP12 anschließen und R15 so einstellen, daß der Maximalsignalpegel bei 0,2 Vss liegt. (Hier die Signalform für CH1 bis CH4 überprüfen).
7	Aufnahme-FM-Pegel	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) legen. • SP-Betrieb • Aufnahme	Kopfanschluß (orangener Draht) [0] [4] PRE AMP	R1 [0] [2] Y/C	1) Das Oszilloskop an den Kopfanschluß anschließen und R1 so einstellen, daß Pegel (a) 1,5 Vss beträgt.
8	Aufnahme-farbpegel	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) legen. • Eigene Aufnahme/ Wiedergabe	TP12 (PB COLOR) [0] [2] Y/C	R12 [0] [2] Y/C	1) Das Oszilloskop an TP12 anschließen. 2) Bei Aufnahme R12 so einstellen, daß die maximale Amplitude von CH1 bis CH4 bei 0,15 Vss liegt.

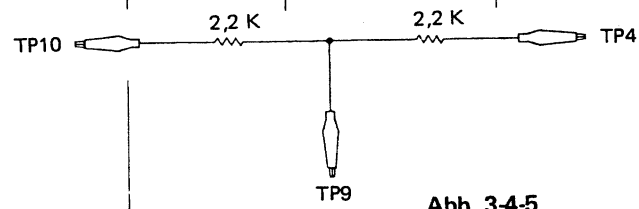


Abb. 3-4-5

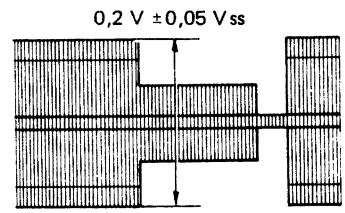


Abb. 3-4-6

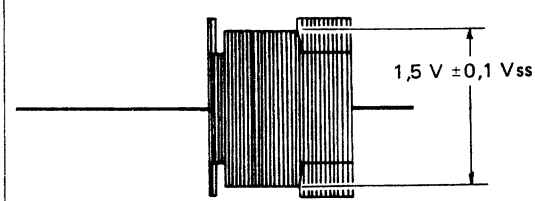


Abb. 3-4-7

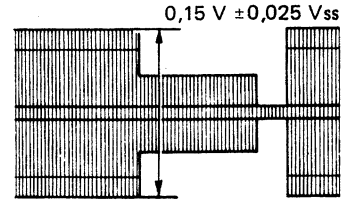
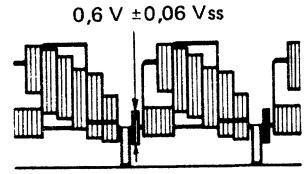
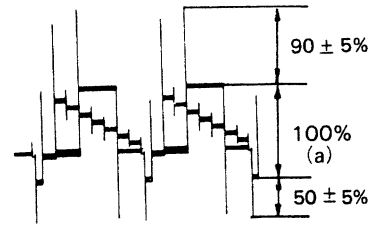
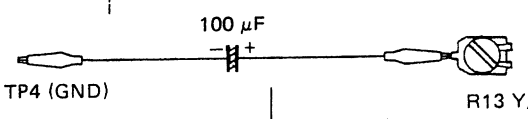
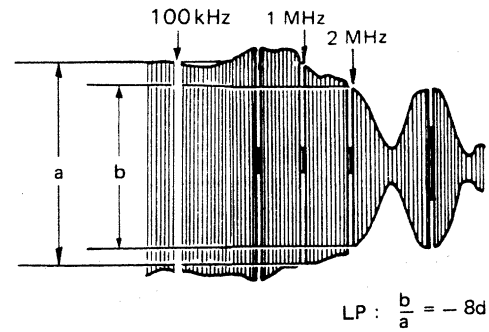
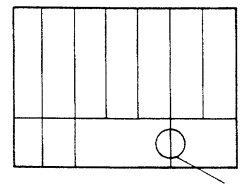
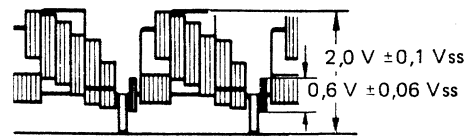
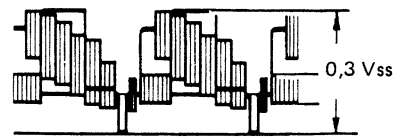


Abb. 3-4-8

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
9	Wiedergabe-Burstpegel	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) legen • Eigene Aufnahme/ Wiedergabe	TP5 (VIDEO OUT) [0] [2] Y/C	R13 [0] [2] Y/C	1) Das Oszilloskop an TP5 anschließen. Mit R13 den Burstpegel bei YP5 auf 0,6 Vss einstellen.  Abb. 3-4-9
10	Weiß- und Schwarzwertbegrenzung	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) legen. • E-E Betrieb	TP2 (EMPHASIS) [0] [2] Y/C	R2 (WHITE CLIP) R3 (DARK CLIP) [0] [2] Y/C	1) Unter Beachtung der Anzeige des anTP-2 angeschlossenen Oszilloskops R2 und R3 so einstellen, daß die Weißwertbegrenzung bei 90 %, die Schwarzwertbegrenzung bei 50 % liegt.  Abb. 3-4-10
11	Trägerfrequenzhub	• Aufnahme • Kein Eingangssignal	TP1 (REC FM) [0] [2] Y/C	R4 (CARRIER) [0] [2] Y/C R5 (DEVIATION) [0] [2] Y/C	1) Bei Aufnahme ohne Eingangssignal R4 so einstellen, daß die Frequenz bei TP1 (Zählwerkdisplay) bei 3,8 MHz ± 50 kHz liegt. 2) Das Farbbalkensignal aufnehmen und wiedergeben. Das Oszilloskop an TP5 anschließen. 3) Bei Aufnahme mit R5 den Y-Pegel bei Wiedergabe auf 2 V ± 0,1 Vss einstellen.
12 (1)	Videoentzerrung	• An CN2 der Y/C-Platine ein externes Videosignal (Wobbelsignal) legen • LP-Betrieb • Eigene Aufnahme/ Wiedergabe	TP5 (VIDEO OUT) [0] [2] Y/C	R10 [0] [2] Y/C	1) Zur Herstellung der in Abb. 3-4-11 gezeigten Kurzschlußschaltung zwischen TP4 (GND) und R14 der Y/C-Platine einen Kondensator mit 100 µF schalten. 2) Die Marken des Wobbelgenerators auf 2 MHz und 100 kHz einstellen. 3) Bei LP-Betrieb ein Wobbelsignal aufnehmen und wiedergeben. R10 so einstellen, daß der 2-MHz-Pegel in Bezug zu 100 Hz über –8 dB beträgt.  Abb. 3-4-11  Abb. 3-4-12 (A)

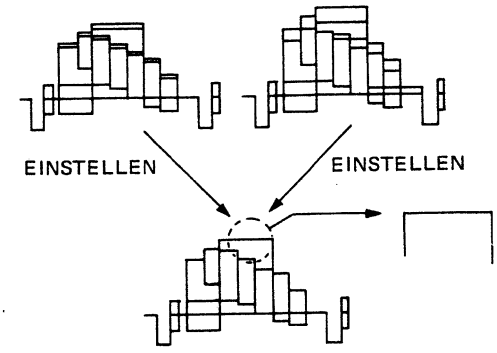
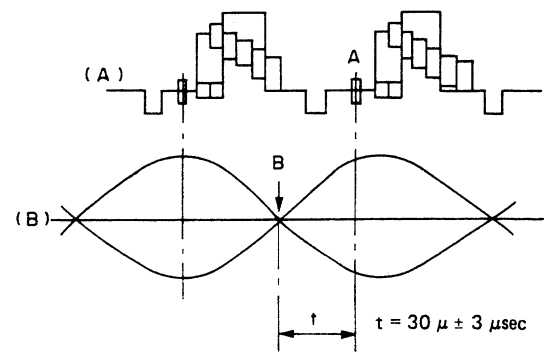
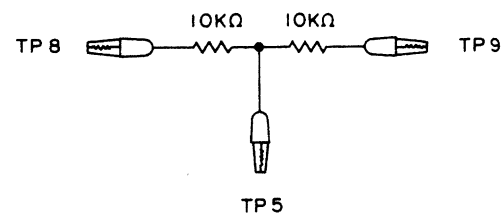
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
12 (2)	Video-entzerrung	• An CN1 der Y/C-Platine ein externes Videosignal (Farbbalken) legen • LP-Betrieb • Eigene Aufnahme/ Wiedergabe	Farbmonitor	R10 [0] [2] Y/C	1) Das Farbbalkensignal bei LP-Betrieb aufnehmen und wiedergeben. 2) Im Monitor den Grenzbereich zwischen Schwarz- und Weißabschnitt im Farbbalken beobachten. 3) Mit R10 der [0] [2] Y/C-Platine Welligkeit im Grenzbereich minimieren.  Welligkeit zwischen Schwarz- und Weißabschnitt minimieren **Fig. 3-4-12 (B)**

[Kamera]

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
13	E-E-Pegel (Kamera-eingang)	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) legen. • E-E-Betrieb	TP5 (V IDEO OUT) [0] [2] Y/C	R9 R11 [0] [2] Y/C	1) Das Oszilloskop an TP5 anschließen. 2) Mit R9 den Y-Pegel bei TP5 auf 2,0 Vss einstellen. 3) Mit R11 den Burstpegel bei TP auf 0,6 Vss einstellen.  **Abb. 3-4-13**
14	Kamera-frequenzhub	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken anschließen. • E-E-Betrieb	TP14 (REC Y) [0] [2] Y/C	R8 [0] [2] Y/C	1) Unter Beachtung der Anzeige des an TP14 angeschlossenen Oszilloskops mit R18 den Y-Pegel auf 0,3 Vss einstellen.  **Abb. 3-4-14**

[S. JUMP]

15	Farbpegel mit 0,5H-Verzögerung	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) anschließen. • Eigene Aufnahme/ Wiedergabe • Farbbalken	TP1 (0.5H DELAY) [1] [2] S. JUMP	R10 [1] [2] S. JUMP	1) Farbbalkensignal aufnehmen und wiedergeben (SP-Betrieb). 2) Das Oszilloskop an TP1 der S. JUMP-Platine anschließen und Pegel (A) merken. 3) TP2 und TP3 an Masse kurzschließen. Den Pegel (B) bei TP1 beobachten. 4) R10 so einstellen, daß Pegel A und B gleich sind.

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
16	Video-pegel mit 0,5H-Ver-zögerung	• CH-C5L abspielen • Farb-balken	TP5 [0] [2] Y/C	R34 [1] [2] S. JUMP	1) Das Oszilloskop bei Wiedergabe von CH-C5L an TP5 der Y/C-Platine anschließen. 2) R34 der S. JUMP-Platine so einstellen, daß die in Abb. 3-4-15 gezeigte Signalform vorliegt.  **Abb. 3-4-15**
17	APC-Fehler-phase	• An CN2 der Y/C-Platine ein externes Videosignal (Farbbalken) anschließen. • Eigene Aufnahme/ Wiedergabe	TP10 TP6 [1] [2] S. JUMP	L1 [1] [2] S. JUMP	1) Ein Zweikanal-Oszilloskop an TP10 und TP6 anschließen. Den Kern von L1 so einstellen, daß Burstphase (A) und 7,8-kHz-Signalform (B) wie in der Abb. gezeigt vorliegen, t = 30 μ ± 3 μsec.  **Abb. 3-4-16**
18	0,5H Sprung-Abtastung	• E-E-Betrieb • Kein Eingangs-signal	TP4 (0.5H JUMP DET) [1] [2] S. JUMP	R16 [1] [2] S. JUMP	1) An TP5 eine stabile Gleichspannung von 2,5 V anlegen (oder das in Abb. 3-4-17 gezeigte Meßinstrument an TP8, TP9 und TP5 anschließen. 2) Den Frequenzzähler an TP4 anschließen. 3) Mit R16 die Frequenz bei TP4 auf 30 kHz ± 0,2 kHz einstellen.  **Abb. 3-4-17**

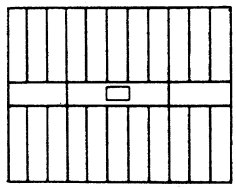
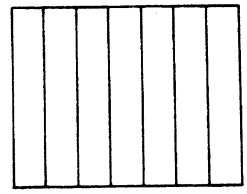
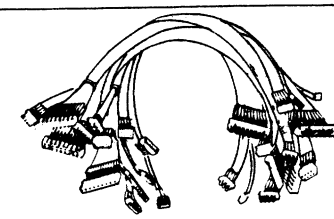
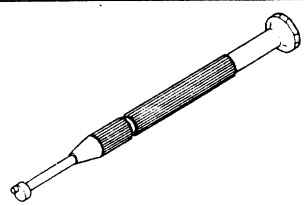
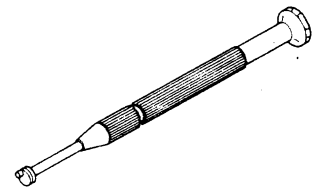
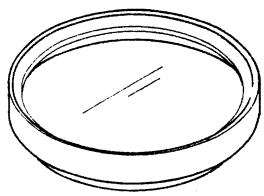
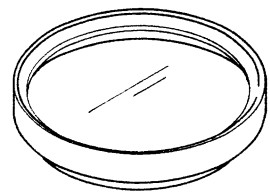
Hinweis: Nach Durchführung aller Einstellarbeiten unbedingt CH-C5L wiedergeben.

3.5 AUDIOSCHALTUNG

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
1	Wiedergabe-pegel	• MH-C2 abspielen • Farbbalken • Wiedergabe	TP302 (AUDIO OUT) [0] [1] MAIN	R322 [0] [1] MAIN	1) Den NF-Voltmeter an TP302 anschließen und MH-C2 (1 kHz) abspielen. Bei Wiedergabe mit R322 auf –6 dBs (1,1 Vss) ±0,5 dBs einstellen.
2	Vor-magnetisie-rungspegel	• Aufnahme • Kein Ton-Eingangs-signal	TP304 (BIAS LEVEL-2 TP303 (BIAS LEVEL-1)	R344 [0] [1] MAIN	1) Die spannungsführende Seite des NF-Voltmeters an TP303, Erde an TP304 anschließen. 2) Mit R344 den Vormagnetisierungspegel auf 2,2 mV ± 0,2 m Veff. einstellen.
3	Aufnahme-pegel	• SP-Betrieb • 1 kHz, –8 dBs Eingang • Eigene Aufnahme/ Wieder-gabe	TP302 (AUDIO OUT) [0] [1] MAIN	R314 [0] [1] MAIN	1) Bei Aufnahme R314 so einstellen, daß der TP-302-Wert bei Wiedergabe bei –6 ± 1 dBs liegt.

3.6 KAMERAEINSTELLUNG

3.6.1 Erforderliche Sonderausrüstung

Grauskala (GS-2A) reflektierend, 11 Stufen, $\gamma = 2,2$	Farbbalken (CC-2A), reflektierend, 7 Farben	Verlängerungskabelsatz (PUJ93991B)
		
Rückfocus-Einstellwerkzeug (PUJ37186A)	Autofocus-Rückfocus-Einstellwerkzeug (PUJ37186B)	Vorlagekarte für Autofocus-Rückfocus-einstellung (PUJ93944)
		
Farbtemperatur-Konversionsfilter (PUJ55340A-C2, C4, C8)	Neutralfilter (PUJ53341A–ND2, ND4, ND8)	Farbkompensierfilter – CC10Y (CC10Y wird von Kodak hergestellt)
		Dieser Filter ist CC10Y von Kodak

3.6.2 Andere erforderliche Werkzeuge und Ausrüstungsgegenstände

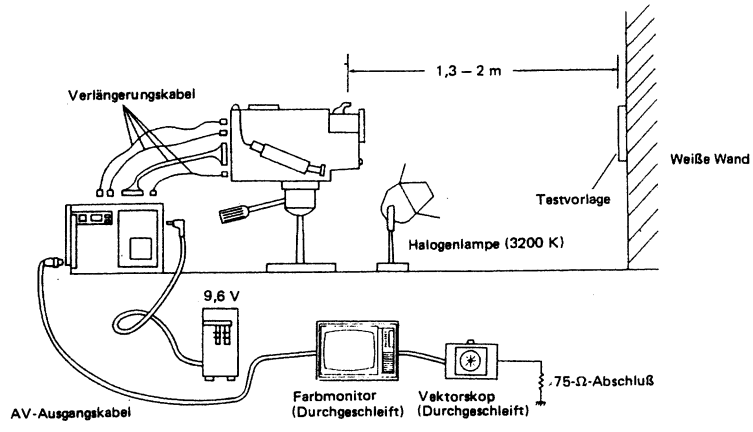
- Halogenlampen (zu je 3200K) . . . . . mindestens 2
- 9,6 V Gleichspannungsversorgung (AA-V2 o.ä.)
- Hautton-Testvorlage (klare Farbphase)

3.6.3 Andere Meßinstrumente

- Oszilloskop
- Vektorskop
- Farb-Videomonitor
- Digital-Voltmeter
- Beleuchtungsmesser
- Farbtemperaturmesser

3.6.4 Standardaufstellung und -anschlüsse

Kamera- und Rekorderteil voneinander trennen und beide Geräteteile über Verlängerungskabel miteinander verbinden. Um die Abgleichpunkte einstellen zu können, müssen VIDEO-, EE & IND- sowie REG-Platine entnommen werden. Hierbei darauf achten, die flexiblen Kabelverbindungen nicht zu beschädigen!



3.7 VORBEREITENDE MASSNAHMEN UND PRÜFARBEITEN VOR DEN EINSTELLARBEITEN AN DER KAMERA

3.7.1 Hinweis vor den Einstellarbeiten

Die in diesem Abschnitt beschriebenen elektrischen Einstellungen sind generell bei Austausch von elektrischen Teilen erforderlich.
Bei Annahme von Störungen in der Elektronik zunächst die Fehlfunktion lokalisieren und dann wie erforderlich reparieren oder austauschen. Erst nach solchen Prüfarbeiten Einstellungen vornehmen. Die Regelwiderstände niemals ohne vorherige Fehlerlokalisierung drehen.
Die folgenden Angaben sind grundsätzliche Einstellschritte. Die jeweils notwendigen Schritte durchführen.

3.7.2 Vorbereitungen und Testpunkte

1. Beleuchtung der Testvorlagen.
   Zur korrekten Einstellung ist die einwandfreie Ausleuchtung der Testvorlage wesentlich!
   Leuchten mit je 3200°K verwenden und mit diesen die Testvorlage gleichmäßig mit ca. 4000 Lux ausleuchten. (Mindestens zwei Leuchten werden empfohlen.)
2. Testvorlage
   Neue und saubere Testvorlagen verwenden.
3. Dieses Modell verfügt über vollautomatischen Farbtemperaturmessung. Einstellungen in Zusammenhang mit diesem System, wie z.B. Weißbalanceregelung, werden wesentlich durch das auf den Farbsensor auftreffende Licht beeinflußt. Daher muß der Farbsensor bei diesen Einstellarbeiten geschlossen werden. Andere Lichtquellen außer der korrekten Testvorlagenausleuchtung (Neonleuchten etc.) beachten.
4. Regelwiderstände an Bildwandlerplatine (1) und (2) brauchen nicht eingestellt zu werden.
5. Wenn nicht anders angegeben, Einstellarbeiten bei manueller Entfernungseinstellung und Kunstlicht vornehmen.
6. Obwohl die Verwendung eines Vektorskops nicht vorausgesetzt wird, müssen Einstellarbeiten mit größter Sorgfalt vorgenommen werden.
7. Das Licht sollte durch Neutralfilter gedämpft werden. Falls jedoch kein ausreichender Pegel erzielbar ist, R16 (IRIS) der [2] [4] EE & IND-Platine einstellen.
8. Falls der erforderliche TP1-Pegel nicht erzielt werden kann, R61 (IRIS) der [2] [4] EE & IND-Platine einstellen.

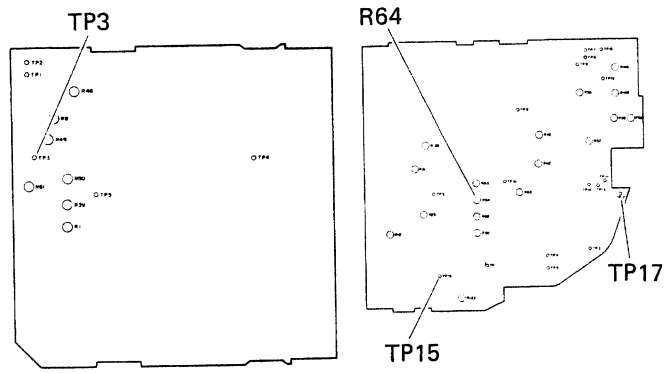
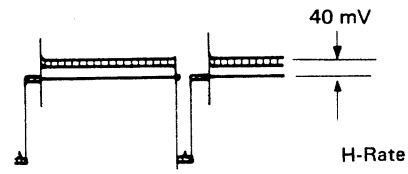
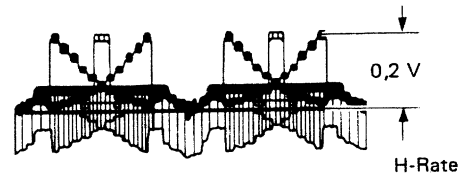
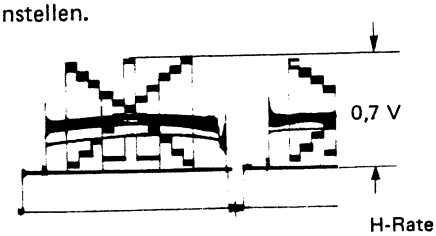
Zur Anzeige kombinierter Filterwerte Ziffern nach dem Bindestrich anfügen.

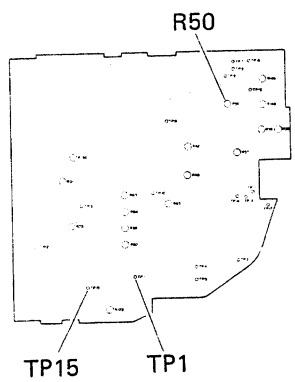
Beispiele:
PUJ53340A-C2 + PUJ53340A-C4 = C2 + C4 = C6
PUJ53341A-ND2 + PUJ53341A-ND8 = $2^1 + 2^3 = 2^4$ = ND16

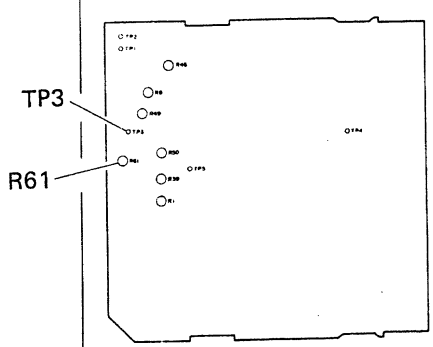
3.7.3 Kameraeinstellvorgänge

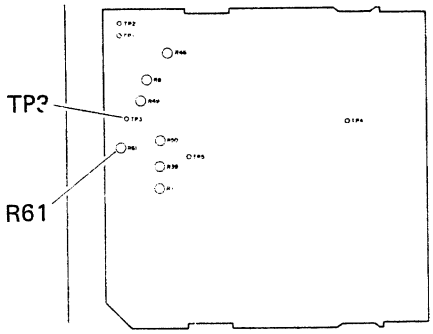
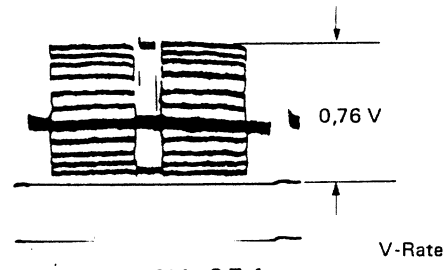
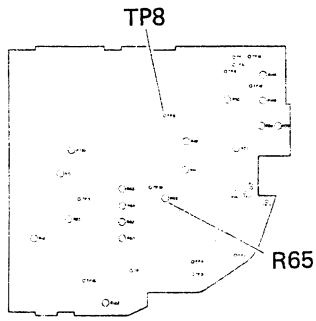
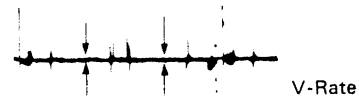
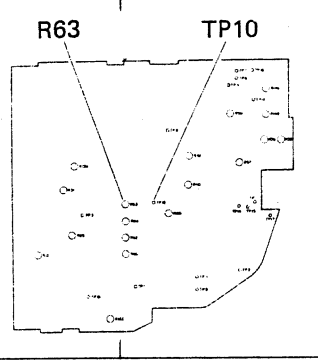
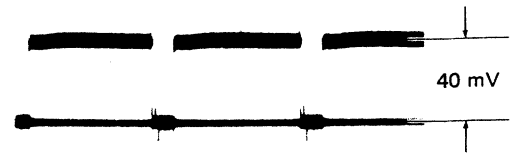
Die folgende Liste umfaßt alle Schritte zur Einstellung der Kameraregelwiderstände, in der erforderlichen Reihenfolge. Jeweils nur die erforderlichen Schritte durchführen.

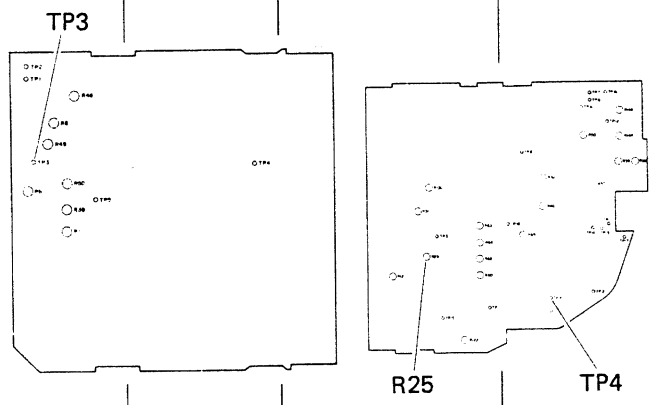
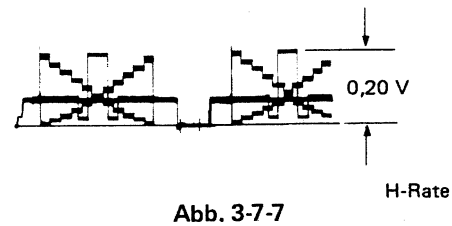
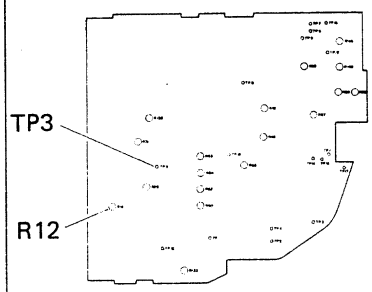
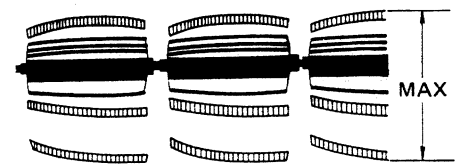
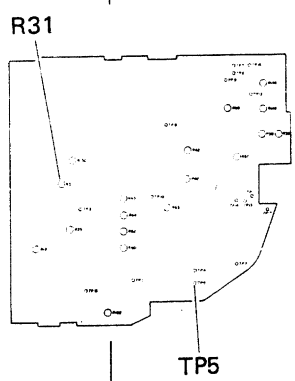
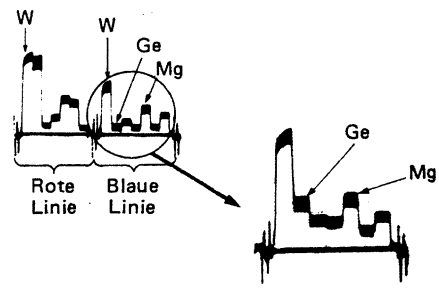
1. 8-V-Einstellung
2. Y_H-Schwarzabhebungs-Einstellung
3. Y_H-Verstärkungs-Einstellung
4. E-E-Pegel-Einstellung
5. V. Konturbalance-Einstellung
6. Y_L-Schwarzabhebungs-Einstellung
7. Y_L-Verstärkungs-Einstellung
8. DET-Steuerphasen-Einstellung
9. R/B-Balance-Einstellung
10. R und B-Schwarzabhebungs-Einstellung
11. R. Begrenzer-Einstellung
12. S.C. Phasen-Einstellung
13. Farbdifferenzabgleichs-Einstellung
14. Rauschunterdrückungsausgleichs-Einstellung
15. Trägerbalance-Einstellung
16. B-Y-Verstärkungs-Einstellung
17. Farbsensor-Einstellung
18. Weißbalance-Einstellung (1)
19. Weißbalance-Einstellung (2)
20. Weißbalance-Einstellung (3)
21. Burstphasen-Einstellung
22. Burstverstärkungs-Einstellung
23. Chroma-Verstärkungs-Einstellung
24. Weißbegrenzer-Einstellung
25. E-E-Pegel-Einstellung
26. AGC-Einstellung
27. Sucheranzeigen-Einstellung
28. Rückfocus-Einstellung

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
1	8V-Einstellung	Abgedecktes Objektiv	Pin 3 von CN-E5 (SW-8V (1)) [2] [4] EE & IND	R6 (8V Einst.) [2] [8] REG	1) Das Digital-Voltmeter zwischen Pin 3 von CN-E5 und Erde schalten. 2) Mit R6 (8V Einst.) den Pegel von Pin 3 von CN-E5 auf 8,0 +/-0,1 V einstellen.
2	Y_H-Schwarzabhebungs-Einstellung	Abgedecktes Objektiv AGC abgeschaltet	TP3 (Y OUT) [2] [4] EE & IND	R64 (Y_H SETUP)	1) TP15 (AGC OFF) und TP17 (GND) kurzschließen. 2) Bei abgedecktem Objektiv die Signalform der H-Rate bei TP3 (Y OUT) beobachten. 3) Mit R64 (Y_H SETUP) den SETUP-Pegel auf 40 mV einstellen. 4) Die TP-Kurzschlußschaltung beenden.   **Abb. 3-7-1** **Hinweis:** Falls der Pegel auch nach Einstellung von R64 (Y_H SETUP) unzureichend ist, R50 (Y_H SETUP) der [2] [3] VIDEO-Platine, R8 (WHITE CLIP) der [2] [4] EE & IND-Platine und R61 (IRIS) einstellen.
3	Y_H-Verstärkung	Grauskala Bildschirmfüllend AGC abgeschaltet	TP1 (S/H OUT) [2] [3] VIDEO	R50 (Y_H GAIN) [2] [3] VIDEO	1) TP15 (AGC OFF) und TP17 (GND) kurzschließen. 2) Die Grauskala aufnehmen. 3) Mit R61 (IRIS) den Signalpegel bei TP1 (S/H OUT) auf 0,2 V einstellen.  **Abb. 3-7-2** **Hinweis:** Zwischen TP1 (S/H OUT) und das Oszilloskop einen 10-kOhm- (oder darüber) Widerstand schalten. 4) In der obigen Anordnung mit R50 (Y_H GAIN) den Signalpegel bei TP3 (Y OUT) auf, 0,7 V einstellen.  **Abb. 3-7-3** 5) Die Einstellungen von Nr. 2 (Y_H-Einstellung) und Nr. 3 nochmals überprüfen. 6) Die TP-Kurzschlußschaltung beenden.



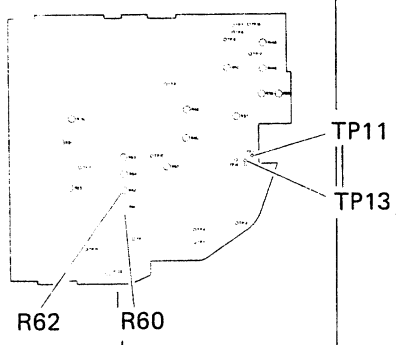


Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
4	E-E-Pegel	Grauskala Bildschirm-füllend	TP3 (Y OUT) [2] [4] EE & IND	R61 (IRIS) [2] [4] EE & IND	1) Die Grautreppe bildschirmfüllend aufnehmen. (Den Bildwinkel exakt ausrichten, so daß die Außenkante der Grauskala mit dem Rahmen der Bildperiode zusammenfällt.) 2) Die Signalform von TP3 (Y OUT) im Auge behalten und R61 (IRIS) so einstellen, daß das Weiß-Maximum bei 0,76 V liegt.   **Abb. 3-7-4** **Hinweis:** Falls der oben gezeigte Pegel nach Einstellung von R61 (IRIS) nicht verfügbar ist, R8 (WHITE CLIP) der [2] [4] EE & IND-Platine einstellen.
5	V. Kontur-balance	Grauskala Bildschirm-füllend	TP8 (V. EDGE) [2] [3] VIDEO	R65 (V. EDGE VAL) [2] [3] VIDEO	1) Die Grauskala aufnehmen. 2) Das Oszilloskop an TP8 (V. EDGE) anschließen und die Signalform der V-Rate beobachten. 3) Mit R65 (V. EDGE VAL) den Durchschnitts-pegel der Signalform auf null einstellen.   **Abb. 3-7-5** Vor der Durchführung der Farbeinstellungen eine Farbtestkarte abbilden. Bei insgesamt inkorrekter Farbqualität die folgenden Einstellarbeiten vornehmen. Die Einstellungen sind gleichfalls bei Farbtonabweichungen unter dunklen Lichtverhältnissen erforderlich. 1) Y_L-Einstellung (Nr. 6), Y_L-Verstärkung (Nr. 7), R/B-Balance (Nr. 9), R-Begrenzer (Nr. 11), B-Y-Verstärkung (Nr. 16), und Chroma-Verstärkung (Nr. 23). Diese Einstellarbeiten ergeben jedoch keine korrekte Farbqualität, wenn das Kodiersystem nicht korrekt eingestellt ist. Daher sind Einstellungen für das Kodiersystem erforderlich.
6	Y_L-Schwarz-abhebung	Abgedecktes Objektiv	TP10 (Y_L) [2] [3] VIDEO	R63 (Y_L SETUP) [2] [3] VIDEO	1) Das Objektiv abdecken. 2) Die Signalform von TP10 (Y_L) im Auge behalten und R63 (Y_L SETUP) auf 40 mV Signalform einstellen.   **Abb. 3-7-6**

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
7	Y_L-Verstärkung 	Grauskala Bildschirmfüllend	TP4 (Y_L) 2 3 VIDEO	R25 (Y_L GAIN) 2 3 VIDEO	1) Die Grauskala abbilden. 2) Einen oder mehrere Neutralfilter (ca. ND8) anbringen, so daß der Signalpegel bei TP3 (Y OUT) 0,6 V beträgt. 3) Mit R25 (Y_L GAIN) den Signalpegel bei TP4 (Y_L) auf 0,20 V aufstellen.  **Abb. 3-7-7**
8	DET-Steuerphase 	Farbbalkenvorlage	TP3 (DET OUT) 2 3 VIDEO	R12 (DET PHASE)	1) Die Farbbalkenvorlage abbilden. 2) Mit R12 (DET OUT) TP3 (DET OUT) auf Maximal-Signalpegel einstellen.  **Abb. 3-7-8**
9	R/B-Balance 	Farbbalkenvorlage Bildschirmfüllend	TP5 (R/B) 2 3 VIDEO	R31 (R/B BAL) 2 3 VIDEO	1) Die Farbbalkenvorlage abbilden. 2) Das Oszilloskop an TP5 (R/B) anschließen und die Oszilloskop-Zeitachse einstellen, um das Signal der roten und blauen Linien zu überwachen. 3) Das Signal der blauen Linie merken und R31 (R/B BAL) so einstellen, daß Magenta- und Gelbanteile der Farbvorlage gleiche Pegel besitzen. **Hinweis:** Die blaue Linie ist die Abtastlinie des niedrigeren Weißpegels.  **Abb. 3-7-9**

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
10	R- und B-Schwarz-abhebung (Grob)	Abgedecktes Objektiv	TP11 (B) TP13 (R) [2] [3] (VIDEO)	R60 (R SETUP) R62 (B SETUP) [2] [3] VIDEO	1) Das Oszilloskop an TP4 (C OUT) der [2] [4] EE & IND-Platine anschließen. 2) R60 (R SETUP) und R62 (B SETUP) auf minimalen Trägerrest einstellen.
11 (1)	R.-Begrenzer	Farbbalken-vorlage	VIDEO OUT (Vektorskop)	R130 (R LIMIT) [2] [3] VIDEO	1) Die Farbbalkenvorlage abbilden. 2) Mit R130 (R LIMIT) maximalen Signalpegel für Rot beim Vektorskop einstellen.
11 (2)	R.-Begrenzer	Farbbalken-vorlage	TP13 (R) [2] [3] VIDEO	R130 (R LIMIT) [2] [3] VIDEO	1) Die Farbbalkenabbildung abbilden. 2) Das Oszilloskop an TP13 (R) anschließen und mit R130 (R LIMIT) den Maximalpegel einstellen.

Bei Verwendung von Vektorskop und Farbbalken.



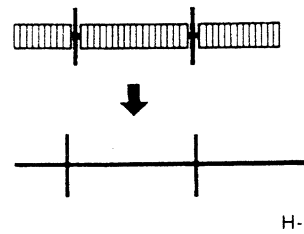
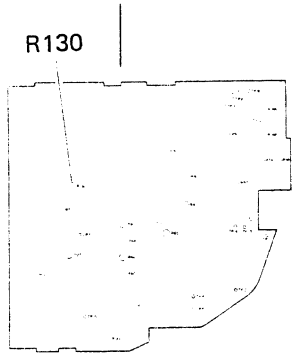


Abb. 3-7-10



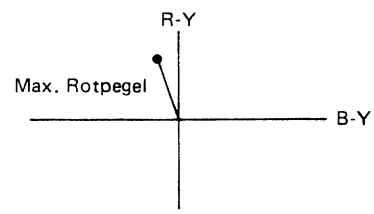
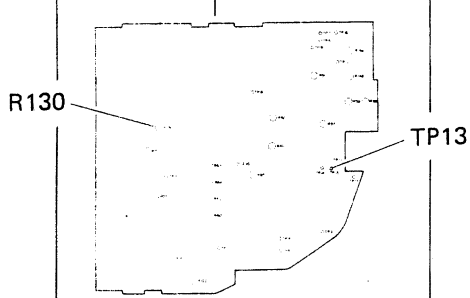


Abb. 3-7-11

Bei nicht verfügbarem Vektorskop.



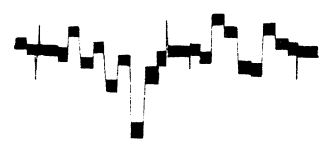
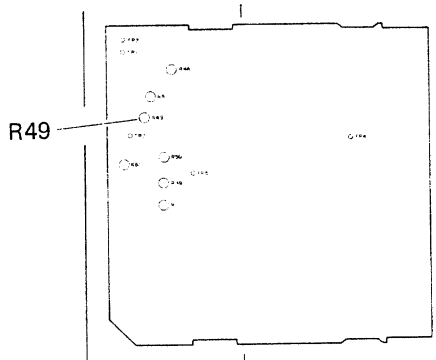


Abb. 3-7-12

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
12 (1)	S.C. -Phase	Farbbalken-vorlage	VIDEO OUT (Vektorskop)	R49 (S.C. PHASE) [2] [4] EE & IND	1) Die Farbbalkenvorlage abbilden. 2) Das Vektorskop im Auge behalten und R49 (SC PHASE) so einstellen, daß das rote Ende (A) überlappt wird.
12 (2)	S.C. -Phase	Abgedecktes Objektiv	TP4 (C. OUT) [2] [4] EE & IND	R49 (S.C. PHASE) [2] [4] EE & IND	1) Das Oszilloskop an TP4 (C. OUT) anschließen. H-Rate und Burst-Wobbelsignal verwenden. 2) R49 (SC PHASE) auf bestmögliche Konturenschärfe einstellen.
13 (1)	Farb-differenz-ausgleich	Farbalken-vorlage	VIDEO OUT (Vektorskop)	R40 (COL. DIFF. BAL.) [2] [3] VIDEO	1) Die Farbbalkenvorlage abbilden. 2) R40 so einstellen, daß die Schwingungen der roten Linie im Vektorskop minimiert werden.

Bei Verwendung von Vektorskop und Farbbalkenvorlage.



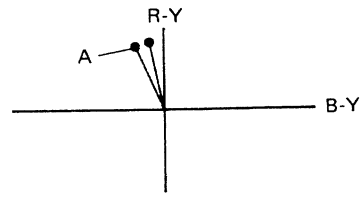
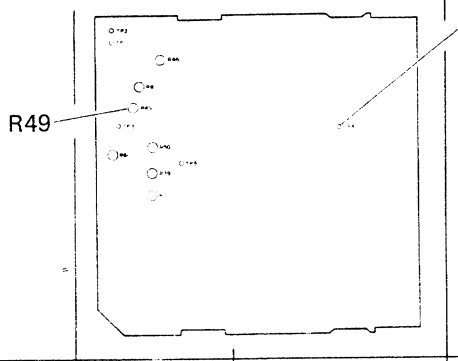


Abb. 3-7-13

Bei nicht verfügbarem Vektorskop und Farbbalken.



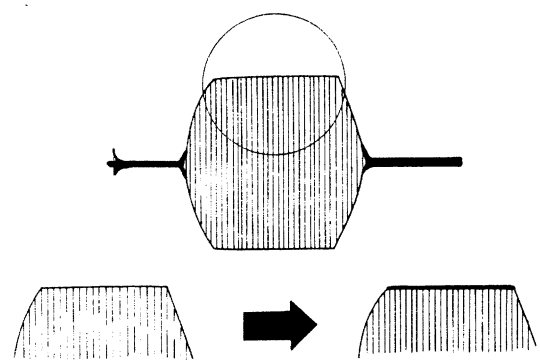
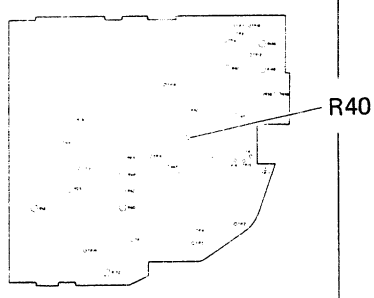


Abb. 3-7-14

Bei Verwendung von Vektorskop und Farbbalkenvorlage.



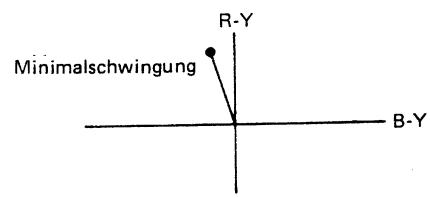
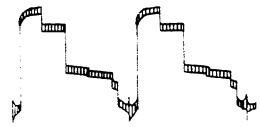
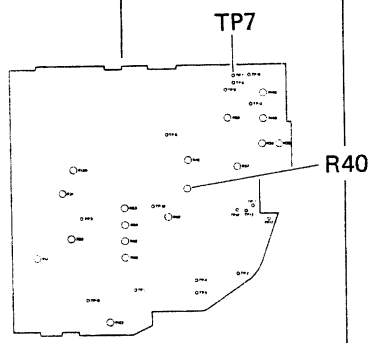
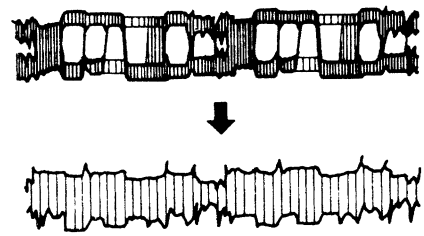
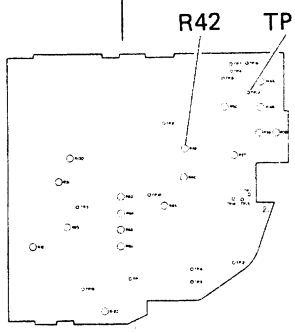
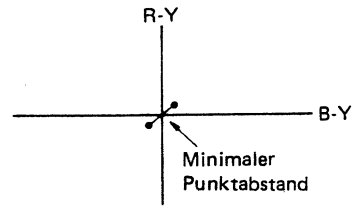
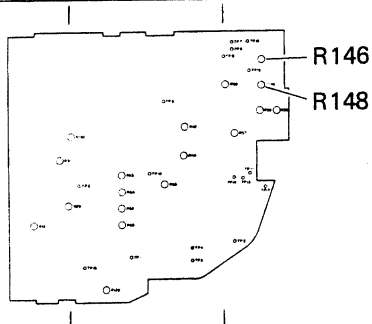
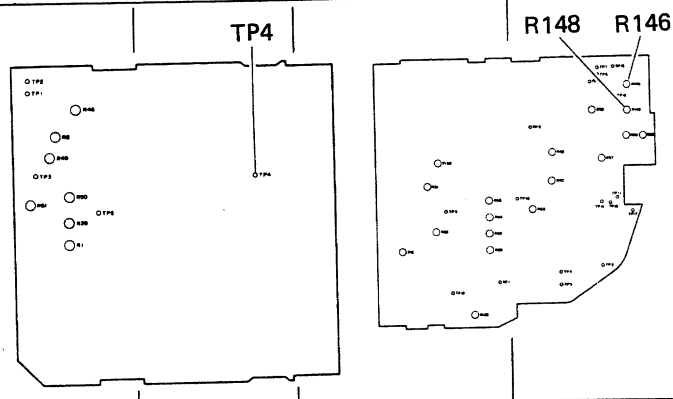


Abb. 3-7-15 (A)

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
13 (2)	Farbdifferenzausgleich	Farbbalkenvorlage	TP7 (B-Y) [2] [3] VIDEO	R40 (COL. DIFF. BAL.) [2] [3] VIDEO	1) Unter Bezugnahme auf die Monitoranzeige den Bildschirm auf große Blau- und Rotbereiche einstellen. 2) Das Oszilloskop an TP7 (B-Y) anschließen und bei der V-Rate mit mittlerem Wobbelsignal beobachten. 3) R40 (COL. DIFF. BAL) so einstellen, daß für jede Horizontal-Linie die gleiche Signalform vorliegt.  **Abb. 3-7-15 (B)**
	Bei nicht verfügbarem Vektorskop.				
14	Rauschunterdrückungsausgleich	Farbbalkenvorlage	TP12 (COLOR NOISE) [2] [3] VIDEO	R42 (NOISE SUP.) [2] [3] VIDEO	1) Die Farbbalkenvorlage abbilden. 2) Mit R42 (NOISE SUP) die Signalform bei TP12 (COLOR NOISE) auf bestmöglichen Ausgleich, wie in der Abb. gezeigt, einstellen.  **Abb. 3-7-16** **Hinweis:** Bei nicht einwandfrei ausgeführtem Farbdifferenzausgleich (13-1 und 13-2) kann diese Einstellung nicht in erforderlichem Maße vorgenommen werden. (Wenn die vorherige Einstellung wie bei Schritt 13-2 vorgenommen wurde, diese beiden Einstellungen abwechselnd mehrmals wiederholen.
					
15 (1)	Trägerbalance	Abgedecktes Objektiv	VIDEO OUT (Vektorskop)	R146 (B.L.S. CARRIER BAL) R148 (R.L.S. CARRIER BAL) [2] [3] VIDEO	1) R146 (B.L.S. CARRIER BAL) und R148 (R.L.S. CARRIER BAL) so einstellen, daß der Punktabstand im Vektorskop als Minimum vorliegt.  **Abb. 3-7-17 (A)**
	Bei Verwendung des Vektorskops und der Farbbalkenvorlage				

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
15 (2)	Träger-balance	Abgedecktes Objektiv	TP4 (C. OUT) [2] [4] EE & IND	R146 (B.L.S CARRIER BAL) R148 (R.L.S. CARRIER BAL)	1) Das Oszilloskop an TP4 (C OUT) anschließen. 2) Mit R146 (B.L.S. CARRIER BAL) und R148 (R.L.S. CARRIER BAL) den Signalpegel bei TP4 (C OUT) auf sein Minimum einstellen.
15 (3)	Träger-balance	Abgedecktes Objektiv	TP4 (CHROMA OUT) [2] [4] EE & IND	R48 (R CARR. BAL) R39 (B CARRIER BAL) [2] [3] VIDEO	1) Bei abgedecktem Objektiv TP11 (B), TP13 (R) und TP17 (GND) kurzschließen. 2) Die Signalform bei TP4 (CHROMA OUT) im Auge behalten und zur Minimierung des Trägerrests abwechselnd R38 (R. CARR BAL) und R39 (B CARR BAL) einstellen. 3) Die TP-Kurzschlußschaltung beenden. 4) Die Einstellungen für Punkte 15 (1) bis 15 (3) mehrmals wiederholen.
16	B-Y-Ver-stärkung	Farbbalken Bildschirm-füllend	TP6 (B-Y) TP7 (R-Y) [2] [3] VIDEO	R57 (B-Y) [2] [3] VIDEO	1) Das Oszilloskop an TP6 (B-Y) und TP7 (R-Y) anschließen. 2) Bei Zweikanalbetrieb R57 (B-Y) auf gleiche Signalform einstellen.

Bei nicht verfügbarem Vektorskop und Farbbalken.



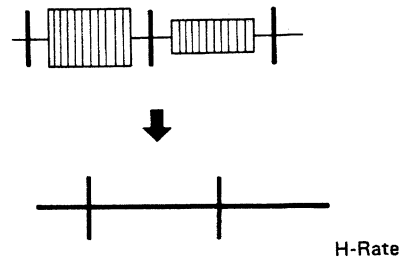
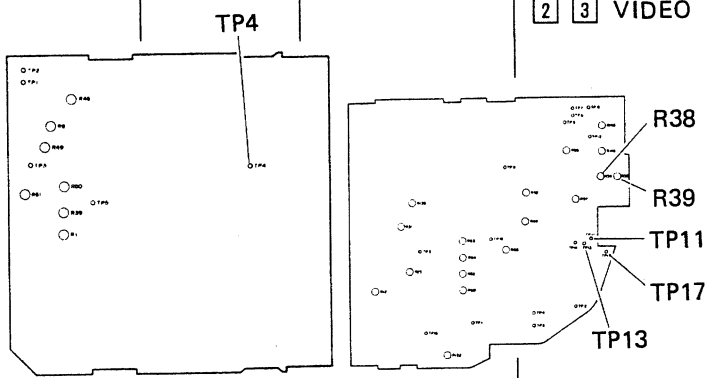


Abb. 3-7-17 (B)



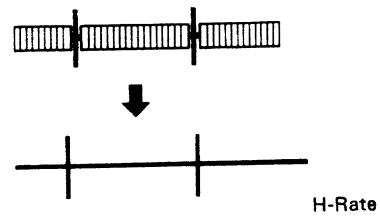


Abb. 3-7-18

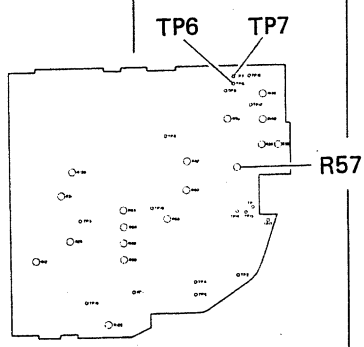
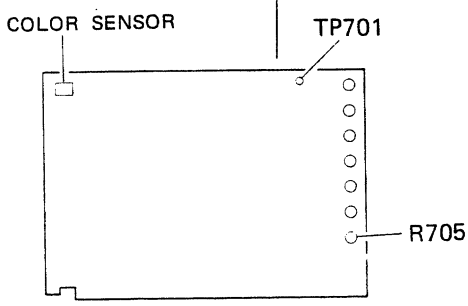
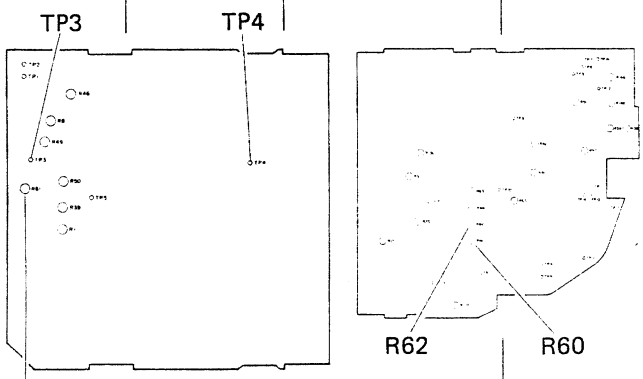
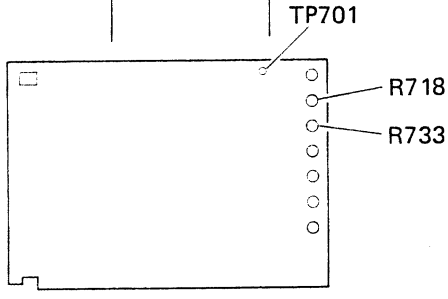


Abb. 3-7-19

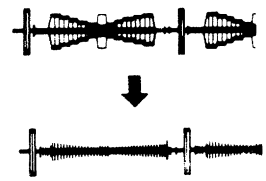
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
17	Farbsensor	3200 K CB-Filter Grauskala	TP701 (COL. SENS) [2] [6] CTL & FAW	R705 (COL. SENS) [2] [6] CTL & FAW	1) Durch einen Filter (C8) das von der Grauskala reflektierte Licht zum Farbsensor leiten (der mit Weißfilterkappe und Halterung vorbereitet sein muß). Zur Ausschaltung anderer Lichtzufuhr die Farbsensorrückseite mit schwarzem Vinylband abdecken. Die Grauskala muß an einer weißen Wand angebracht sein und die Lichtzufuhr von den Halogenleuchten sollte möglichst breit abstrahlen. 2) Das Digital-Voltmeter an TP701 anschließen und mit R705 (COL. SENS) auf 1,85 ±0,01 V einstellen. **Hinweis:** Zur Erzielung einer einwandfreien Einstellung muß der Hintergrund des Testmusters weiß sein! Andernfalls kann die Weißbalance nicht einwandfrei eingestellt werden. Mit den Weißbalanceeinstellungen (1) und (2) bei gleicher Anordnung fortfahren.
18 (1)	Weißbalance	Grauskala Vollauto. Weißbalance C8 + CC10Y → Objektiv C8 → Sensor	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] EE & IND	R60 (R SETUP) R62 (B SETUP) [2] [3] VIDEO	1) Mit angebrachtem C8- und CC10Y-Filter die Grauskala bei Vollautomatik-Weißbalance abbilden. Gleichzeitig einen Kaltlichtfilter am Farbsensor anbringen, so daß die Spannung bei TP701 1,85 V ±0,01 V beträgt. Sicherstellen, daß diese Spannung konstant beibehalten wird. **Hinweis:** Darauf achten, daß nur das Halogenlicht im Farbsensor einfällt. 2) TP15 (AGC OFF) und TP17 (GND) kurzschließen. 3) Einen oder mehrere Neutralfilter anbringen, so daß das Weißmaximum bei TP3 (Y OUT) 0,3 V beträgt (ca. ND4 + ND8). 4) Mit R60 (R SETUP) und R62 (B SETUP) abwechselnd auf minimalen Trägerrest bei TP4 (CHROMA OUT) einstellen. **Abb. 3-7-20** H-Rate 5) Mit R61 (IRIS) das Weißmaximum bei TP3 (Y OUT) auf 0,6 V einstellen. 6) Mit R718 (R GAIN INDOOR) und R733 (B GAIN INDOOR) abwechselnd auf minimalen Trägerrest bei TP4 (CHROMA OUT) einstellen. 7) Die Einstellschritte 2) bis 5) mehrmals wiederholen.

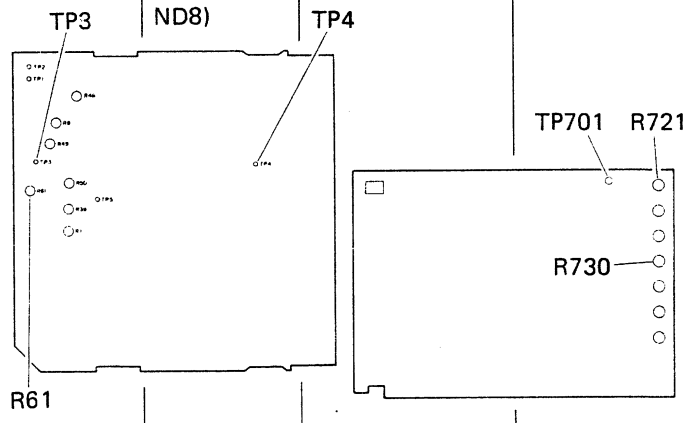
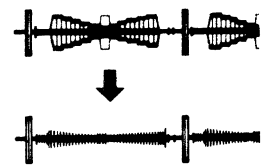
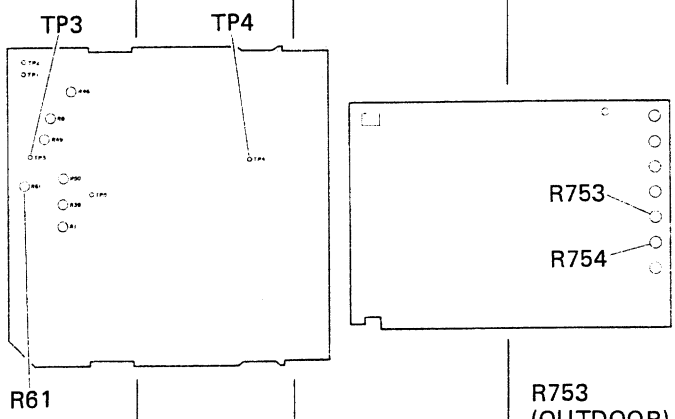
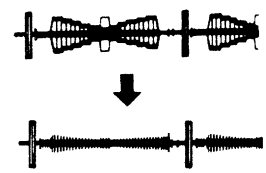






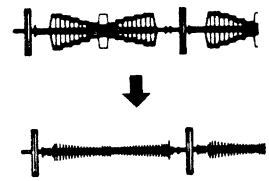
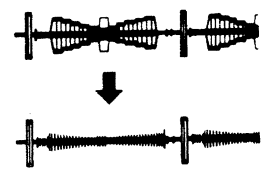
R718 (R GAIN INDOOR) R733 (B GAIN INDOOR) [2] [3] VIDEO

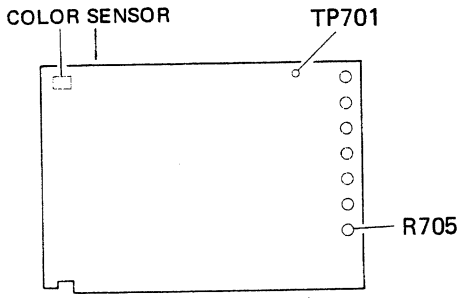
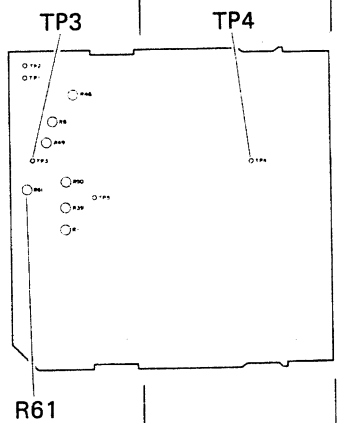
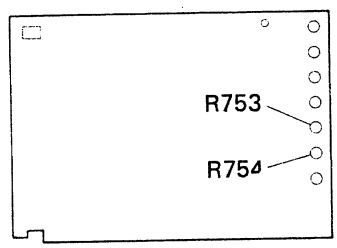
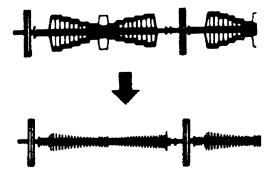


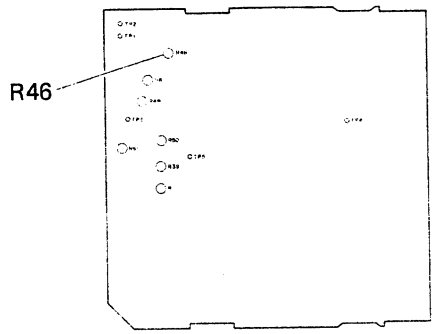
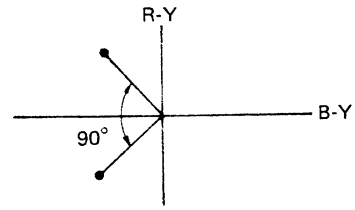
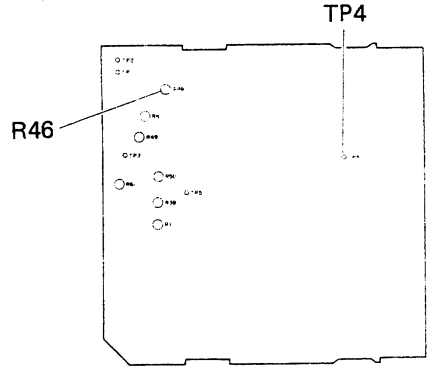
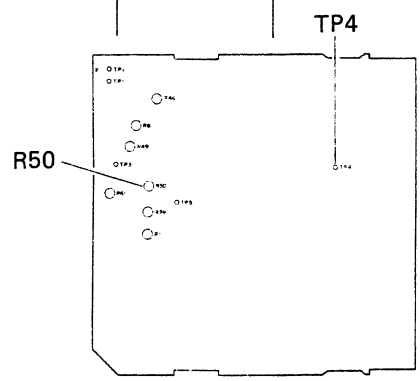
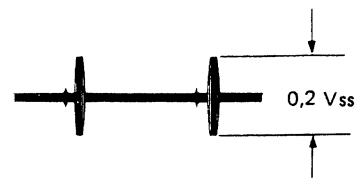
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
19 (2)	Weißbalance  	Grauskala Vollauto. Weißbalance C14 → Objektiv TP1 → 2,20 ±0,01 V (mit Kaltlichtfilter) ca. C16 + ND8)	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] EE & IND	R271 (R GAIN INDOOR) R730 (B GAIN OUTDOOR) [2] [6] CTL & FAW	1) Am Objektiv einen C14-Filter anbringen und die Grauskala bei Vollautomatik-Weißbalance abbilden. Gleichzeitig einen Kaltlichtfilter am Farbsensor (vor der Weißfilterkappe) anbringen, so daß die Spannung bei TP701 bei 2,20 +/-0,01 V liegt. Sicherstellen, daß diese Spannung konstant beibehalten wird. **Hinweis:** Darauf achten, daß nur das Halogenlicht im Farbsensor einfällt. 2) Mit R271 (R GAIN OUTDOOR) und R730 (B GAIN OUTDOOR) abwechselnd auf minimalen Trägerrest bei TP4 (CHROMA OUT) einstellen.  H-Rate **Abb. 3-7-21** 3) Weißbalance-Einstellung (1) und (2) mehrmals wiederholen.
20	Weißbalance  	Grauskala Kunstlicht (Innen) C14-Filter	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] EE & IND	R754 (INDOOR PRESET) [2] [6] CTL & FAW R753 (OUTDOOR) PRESET) [2] [6] CTL & FAW	1) Ohne angebrachten Filter bei Kunstlichtbetrieb die Grauskala abbilden. 2) Mit R61 (IRIS) TP3 (Y OUT) auf 0,6 V Maximalweißpegel einstellen. 3) Mit R754 (INDOOR PRESET) den Trägerrest bei TP4 (CHROMA OUT) minimieren.  H-Rate **Abb. 3-7-22** 4) Die Kamera auf Tageslichtbetrieb schalten und die Grauskala mit am Objektiv angebrachten C14-Filter abbilden. 5) Mit R753 (OUTDOOR PRESET) den Trägerrest bei TP4 (CHROMA OUT) minimieren.

Grobeinstellungen

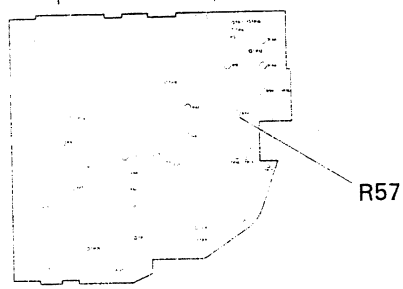
Wenn keine grundsätzlichen Einstellarbeiten erforderlich sind, können folgende vereinfachte Einstellvorgänge vorgenommen werden.

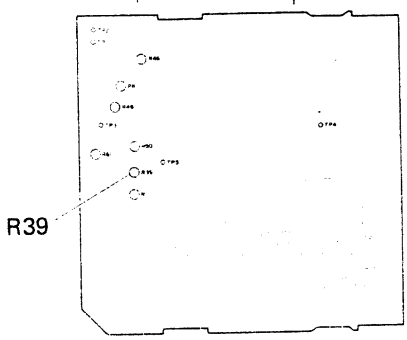
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
A	Weißbalance (1)	Grauskala Vollauto. Weißbalance C8 + CC10Y → Objektiv C8 → Sensor	TP3 (Y OUT) TP4 (CHROMA OUT) [2] [4] E-E & IND	R60 (R SETUP) R62 (B SETUP) [2] [3] VIDEO	1) Bei Vollautomatik-Weißbalance mit angebrachtem C8-Filter die Grauskala abbilden. Das Digital-Voltmeter an TP1 (COL SENS) anschließen und mit R705 auf 1,85 ±0,01 V einstellen. **Hinweis:** Darauf achten, daß nur das Halogenlicht im Farbsensor einfällt. 2) TP15 (AGC OFF) und TP17 (GND) kurzschließen. 3) Einen weiteren Neutralfilter anbringen, so daß das Weißmaximum bei TP3 (Y OUT) bei 0,3 V liegt. (Ca. ND4 + ND8). 4) Durch abwechselnde Einstellung von R60 (R SETUP) und R62 (B SETUP) den Trägerrest bei TP4 (CHROMA OUT) minimieren.
					 H-Rate **Abb. 3-7-23**
				R718 (R GAIN INDOOR) R733 (B GAIN INDOOR) [2] [3] VIDEO	5) Mit R61 (IRIS) den Maximal-Weißpegel bei TP3 (Y OUT) auf 0,6 V einstellen. 6) Durch abwechselnde Einstellung von R718 (R GAIN INDOOR) und R733 (B GAIN INDOOR) den Trägerrest bei TP4 (CHROMA OUT) minimieren. 7) Einstellschritte 2) bis 5) mehrmals wiederholen.
B	Weißbalance (2)	Grauskala Vollauto. Weißbalance C14 → Objektiv TP1 → 2,20 ±0,01 V (mit Kaltlichtfilter) (ca. C16 + ND8)	TP3 (Y OUT) TP (CHROMA OUT) [2] [4] E-E & IND	R721 (R GAIN OUTDOOR) R730 (B GAIN OUTDOOR) [2] [6] CTL & FAW	1) Bei Vollautomatik-Weißbalance mit angebrachtem C14-Filter die Grauskala abbilden. An TP1 (COL SENS) ein Digital-Voltmeter anbringen und mit R705 auf 2,20 +/-0,01 V einstellen. **Hinweis:** Darauf achten, daß nur das Halogenlicht im Farbsensor einfällt. 2) Durch abwechselnde Einstellung von R721 (R GAIN OUTDOOR) und R730 (B GAIN OUTDOOR) den Trägerrest bei TP4 (CHROMA OUT) minimieren.
					 H-Rate **Abb. 3-7-24**
					3) Weißbalanceeinstellungen (1) und (2) mehrmals wiederholen.

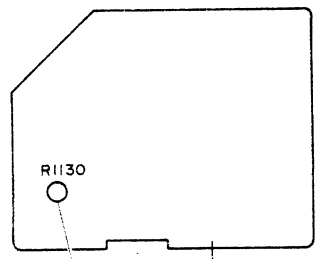
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
C	Farbsensor  	3200 K C8-Filter Grauskala	TP701 (COL. SENS) 2 6 CTL & FAW	R705 (COL. SENS) 2 6 CTL & FAW	1) Durch einen Filter (C8) das von der Grauskala reflektierte Licht zum Farbsensor leiten (der mit Weißfilterkappe und Halterung vorbereitet sein muß). Zur Ausschaltung anderer Lichtzufuhr die Farbsensorrückseite mit schwarzem Vinylband abdecken. Die Grauskala muß an einer weißen Wand angebracht sein und die Lichtzufuhr von den Halogenleuchten sollte möglichst breit abstrahlen. 2) Das Digital-Voltmeter an TP701 anschließen und mit R705 (COL. SENS) auf 1,85 +/-0,01 V einstellen. **Hinweis:** Zur Erzielung einer einwandfreien Einstellung muß der Hintergrund des Testmusters weiß sein! Andernfalls kann die Weißbalance nicht einwandfrei eingestellt werden. Mit den Weißbalanceeinstellungen (1) und (2) bei gleicher Anordnung fortfahren.
D	Weißbalance (3)  	Grauskala Kunstlicht	TP3 (Y OUT TP4 (CHROMA OUT) 2 4 E-E & IND	R754 (INDOOR) PRESET) 2 6 CTL & FAW  R753 (OUTDOOR PRESET) 2 6 CTL & FAW	1) Ohne angebrachten Filter bei Kunstlichtbetrieb die Grauskala abbilden. 2) Mit R61 (IRIS) TP3 (Y OUT) auf 0,6 V Maximalweißpegel einstellen. 3) Mit R754 (INDOOR PRESET) den Trägerrest bei TP4 (CHROMA OUT) minimieren.  H-Rate **Abb. 3-7-25** 4) Die Kamera auf Tageslichtbetrieb schalten und die Grauskala mit am Objektiv angebrachten C14-Filter abbilden. 5) Mit R753 (OUTDOOR PRESET) den Trägerrest bei TP4 (CHROMA OUT) minimieren.

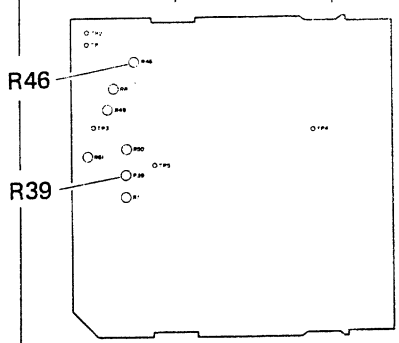
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
21 (1)	Burstphase	Farbbalken-vorlage	VIDEO OUT (Vektorskop)	R46 (B PHASE) [2] [4] E-E & IND	1) R46 (B PHASE) so einstellen, daß der Burstsignalphasenwinkel bei 90° liegt, wie in der Abb. unten gezeigt.
	Bei Verwendung von Vektorskop und Farbbalkenvorlage.				
					 **Abb. 3-7-26**
21 (2)	Burstsignal-phase	Abgedecktes Objektiv	TP4 (C OUT) [2] [4] E-E & IND	R46 (B PHASE) [2] [4] E-E & IND	1) Das Oszilloskop an TP4 (C OUT) anschließen und das Burstsignal überwachen. 2) R46 (B PHASE) auf minimales Burstsignal einstellen.
	Bei nicht verfügbarem Vektorskop und Farbbalken.				
					
22	Burstsignal-verstärkung	Abgedecktes Objektiv	TP4 (CHROMA OUT) [2] [4] E-E & IND	R50 (BURST GAIN) [2] [4] E-E & IND	1) Mit R50 (BURST GAIN) den Burstsignalpegel bei TP4 (CHROMA OUT) auf 0,2 Vss einstellen.
					 **Abb. 3-7-27**

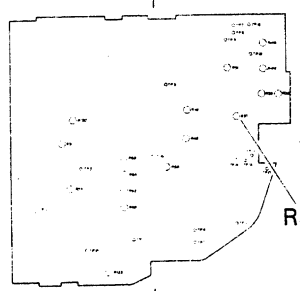
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
23 (1)	Chromaverstärkung B-Y-Verstärkung Gelbunterdrückung	Farbbalkenvorlage **Bei Verwendung von Vektorskop und Farbbalkenvorlage.**	VIDEO OUT (Vektorskop)	R39 (CHROMA GAIN) [2] [4] E-E & IND R57 (B-Y) [2] [3] VIDEO R1130 (yellow sup) [2] [9] SUB CAR	1) Die Farbbalkenvorlage abbilden. 2) Auf 100 % Burstpegel einstellen. 3) Mit R39 (CHROMA GAIN) den Rotpegel auf etwas unter 100 % einstellen. 4) R1130 (YELLOW SUP) bis zum Anschlag gegen den Uhrzeigersinn drehen. 5) R57 (B-Y) auf 100 % Magentapegel einstellen. 6) R1130 (YELLOW SUP) so einstellen, so daß Gelb am Rand des Vektorskop erscheint. 7) Einstellschritte 4 bis 6 mehrmals wiederholen.
23 (2)	Chromaverstärkung	Vorlage mit gut unterscheidbarer Farbphase. **Bei nicht verfügbarem Vektorskop und Farbbalken.**	TV-Monitor	R39 (CHROMA GAIN) [2] [4] E-E & IND R57 (B-Y GAIN) [2] [3] VIDEO R1130 (Yellow sup) [2] [9] PAL SUB	**Hinweis:** Für diese Einstellung, Farbphase und Dichte bei Verwendung eines TV-Monitors, wurde R9 (EE Y LEVEL) der Y/C-Platine im Rekorderteil präzis eingestellt. 1) Die Farbvorlage abbilden und unter Beachtung des TV-Monitors R39 (CHROMA GAIN) auf einen geeigneten Chromapegel einstellen. 2) Eine Vorlage mit gut unterscheidbarer Farbphase abbilden und unter Beachtung des TV-Monitors R1130 (Gelbunterdrückung) und R57 (B-Y GAIN) feineinstellen, um bestmögliche natürliche Farbtonwiedergabe für Rot, Grün, Blau und Hautton zu erzielen. **Hinweis:** Hier nur Feineinstellungen vornehmen. Vor dieser Einstellung müssen Farbsensoreinstellung (Nr. 17) und Weißbalanceeinstellung (1), (2) und (3), (Nr. 18, 19, 20) bereits komplett durchgeführt worden sein!

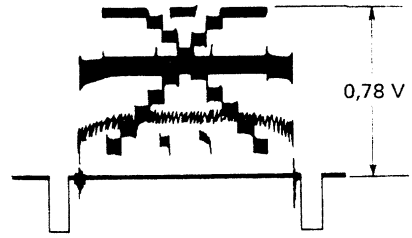
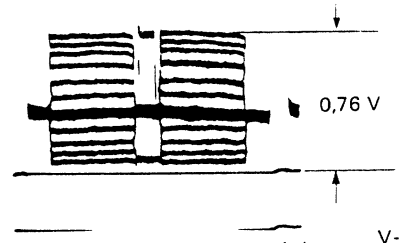


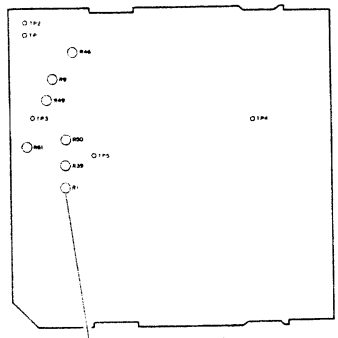
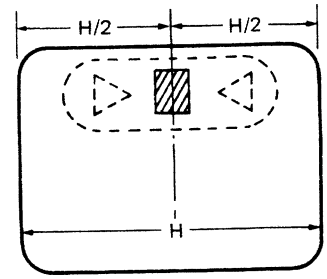
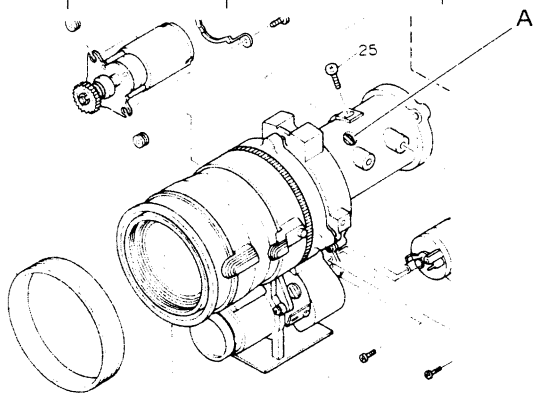








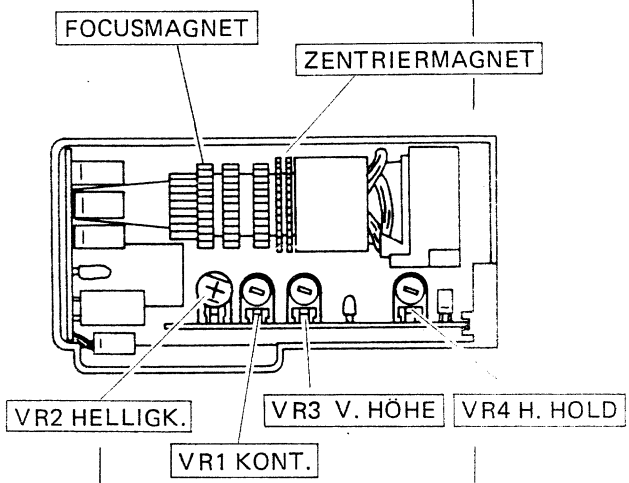
Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
24	Weißwert-begrenzer	Grauskala Bildschirm-füllend	TP3 (Y OUT) [2] [4] E-E & IND	R8 (WHITE CLIP) [2] [4] E-E & IND	1) Die Grauskala abbilden und durch Einstellung von R61 (IRIS) die Blende öffnen, um Signale zu drosseln. 2) Mit R8 (WHITE CLIP) den Weißbegrenzerpegel bei TP3 (Y OUT) auf 0,78 V einstellen.  **Abb. 3-7-28 (a)**
25	E-E-Pegel	Grauskala Bildschirm-füllend	TP3 (Y OUT) [2] [4] E-E & IND	R61 (IRIS) [2] [4] E-E & IND	1) Die Grauskala bildschirmfüllend aufnehmen. (Den Bildwinkel exakt ausrichten, so daß die Außenkante der Grauskala mit dem Rahmen der Bildperiode zusammenfällt.) 2) Die Signalform von TP3 (Y OUT) im Auge behalten und R61 (IRIS) so einstellen, daß das Weiß-Maximum bei 0,76 V liegt.  **Abb. 3-7-28 (b)** **Hinweis:** Vor dieser Einstellung unbedingt Y_H-Schwarzabhebungs Einstellung 3) und Y_H-Verstärkungseinstellung (Nr. 4) vornehmen.
26	AGC	Geschlossene Blende	TP15 (AGC OFF) [2] [3] VIDEO	R122 (AGC) [2] [3] VIDEO	1) Das Digital-Voltmeter zwischen TP15 (AGC OFF) und TP17 (GND) schalten. 2) Mit R122 (AGC) den Pegel bei TP15 (AGC OFF) auf 2,0 V ±0,05 V einstellen.

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
27	Anzeige	Abgedecktes Objektiv	Elektronischer Sucher	R1 (IND OSC) [2] [4] E-E & IND	1) R1 (IND OSC) so einstellen, daß die Sucheranzeige mittig im Sucherbildschirm erscheint.   **Abb. 3-7-29**
28	Rückfocus	Vorlage in ⩾ 100 m Entfernung Geöffnete Blende (mit Neutralfilter)	VIDEO OUT (Monitorbild)	Hauptobjektiv	1) Eine Vorlage in 100 m (und darüber) Entfernung bei auf Weitwinkel gestelltem Objektiv (9 mm) abbilden. 2) Einen Neutralfilter am Objektiv anbringen und die Blende öffnen. (Sicherstellen, daß Anzeige "LIGHT" im Sucherbildschirm erscheint.) 3) Den Entfernungsring auf unendlich (∞) stellen. 4) Schraube (25) lösen und mit dem Rückfocus-Einstellwerkzeug die Position des Hauptobjektivs ausrichten. Dann das Motiv unter Beachtung des TV-Monitors scharfstellen. 5) Nach dieser Einstellung Schraube (25) festziehen und die Scharfeinstellung nochmals überprüfen. 

3.7.4 Einstellung des elektronischen Suchers (EVF)

Vorsicht: Bei der Röhrenanode, am HV-Modul etc. liegt eine hohe Spannung an!

Nr.	Position	Betriebsart	Testpunkt	Abgleichpunkt	Beschreibung
1	Horizontale Sync.	Grauskala oder Monoskop	EVF (Bildröhre)	VR4 (H. HOLD) [3] [0] VF (1)	1) Den Sucherbildschirm im Auge behalten und durch Drehen von VR4 bis zum Anschlag im Uhrzeigersinn auf instabiles Bild einstellen. 2) VR4 schrittweise gegen den Uhrzeigersinn drehen, bis das Bild stabilisiert ist. Bei kompletter Bildstabilisierung die VR-Position mit einem Filzschreiber o.ä. markieren. 3) Hierauf erneut VR4 bis zum Anschlag im Uhrzeigersinn drehen, um das Bild zu destabilisieren. 4) Erneut VR4 schrittweise gegen den Uhrzeigersinn drehen, bis sich das Bild stabilisiert hat. Wie vorher die VR-Position mit einem Filzschreiber markieren. 5) VR4 auf die Mitte zwischen den beiden Markierungen einstellen.
2	Vertikal-Abtastung	Grauskala oder Monoskop	EVF (CRT)	VR3 (V. HEIGHT) [3] [0] VF (1)	1) Unter Beachtung des Sucherbildschirms mit VR3 auf eine normale Bildamplitude einstellen.
3	Zentrierung	Grauskala	EVF (CRT)	Zentriermagnet	1) Die Grauskala mittig im TV-Monitor abbilden. Den Zentriermagneten so einstellen, daß die Grauskalavorlage ebenfalls im Sucherbildschirm mittig abgebildet wird.
4	Focus	Grauskala	EVF (CRT)	Focusmagnet	1) Unter Beachtung des Sucherbildschirms den Focusmagneten des Ablenkjochs so einstellen, daß der Mittenbereich der Grauskala scharf abgebildet wird.
5	Helligkeit	Abgedecktes Objektiv Geschlossene Blende	EVF (CRT)	VR2 (BRIGHT) [3] [0] VF (1)	1) Bei geschlossener Blende VR2 so einstellen, daß das Bildröhrenraster des Sucherbildschirms schwach erkennbar ist.
6	Kontrast	Grauskala	EVF (CRT)	VR1 (CONT) [3] [0] VF (1)	1) Unter Beachtung des Sucherbildschirms mit VR1 auf bestmögliche Gradation der Grauskalaabbildung einstellen.



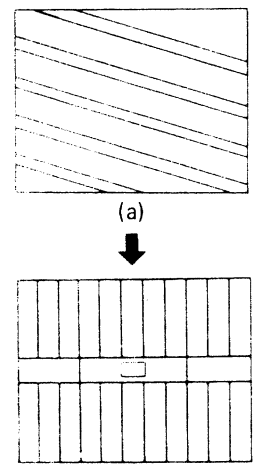


Abb. 3-7-30

3.8 AUSTAUSCH UND EINSTELLUNG DER AUTO-FOCUS-PLATINE

3.8.1 AF-Platineneinheit

Die AF-Platineneinheit umfaßt den ab Werk eingestellten TCL-Sensor und das AF-Linsenbauteil, dessen elektrische Einstellungen komplett im Werk vorgenommen wurden. (Siehe Abb. 3-8-1.)
Daher ist die hauptsächliche Einstellarbeit der AF-Platineneinheit der Abgleich des TCL-Sensors.

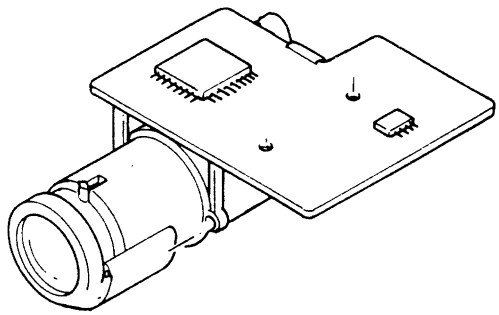


Abb. 3-8-1

3.8.2 Austausch der AF-Platineneinheit

1. Die beiden Sätze Halteschrauben der AF-Platineneinheit, Ⓐ und Ⓑ, entfernen, und die AF-Platineneinheit in Pfeilrichtung abziehen.
2. Eine neue AF-Platineneinheit in umgekehrter Ausbaureihenfolge einbauen.

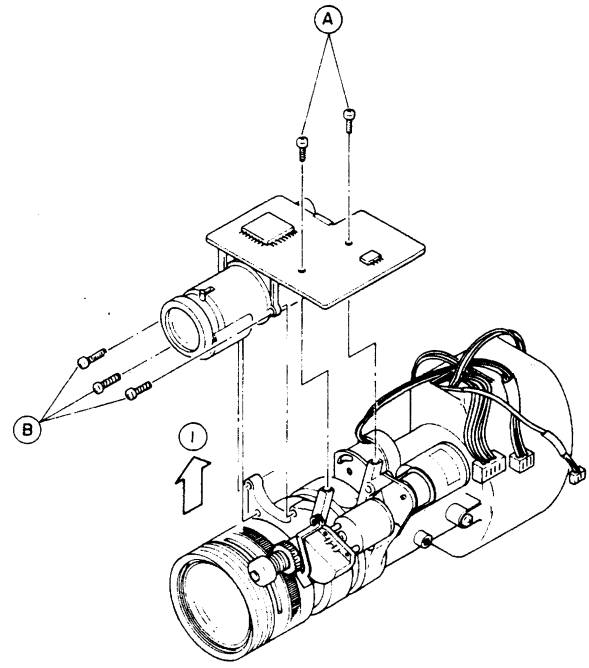


Abb. 3-8-2

3.8.3 Anordnung für Einstellung

Die Testvorlage bei geöffneter Blende abbilden. Die Lichtstärke so einstellen, daß die Anzeige "LIGHT" im Sucherbildschirm als Blinksignal erscheint.

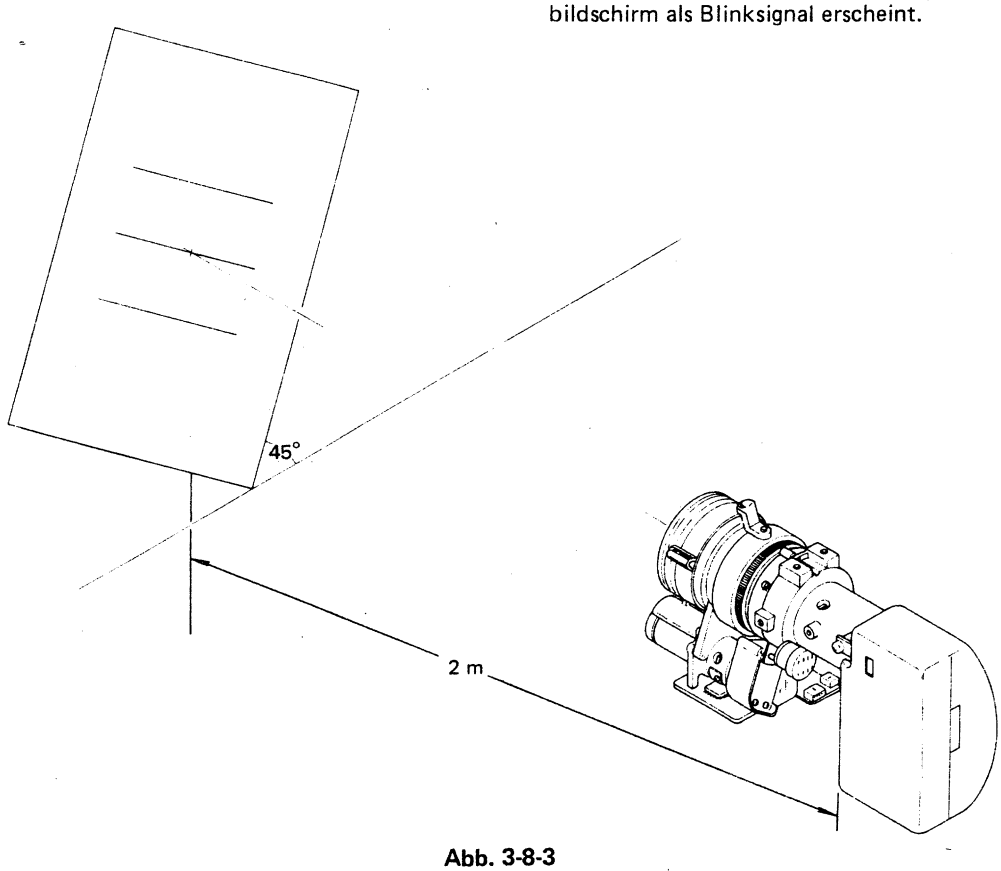


Abb. 3-8-3

3.8.4 AF-Einstellvorlagekarte

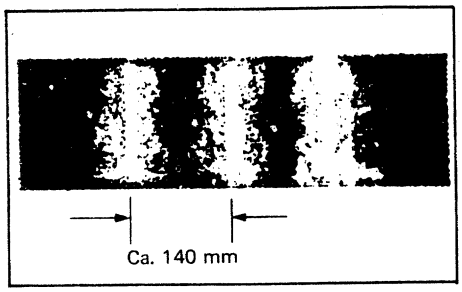


Abb. 3-8-4

3.8.5 AF-Einstellung

Hinweis: Das Rückfocus-System des Objektivsystems muß korrekt eingestellt sein.

1. Die AF-Einstellvorlagekarte und die Beleuchtung wie in Abb. 3-8-3 beschrieben anordnen.
2. Mit dem Zoomring auf den Telebereich stellen und das Objektiv so einstellen, daß die Vorlage bildmittig abgebildet wird.

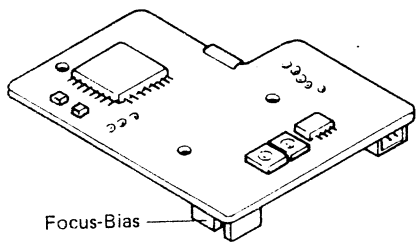


Abb. 3-8-5

3. Das AF-Rückfocus-Einstellwerkzeug in die AF-Linsen-Einstellöffnung einführen und die Arretierschraube lösen.

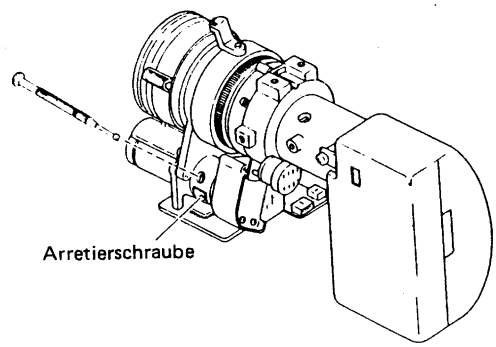


Abb. 3-8-6

4. Unter Beachtung der AF-Sucheranzeige die AF-Linsenposition mit dem AF-Rückfocus-Einstellwerkzeug einstellen und die Linse wieder mit der Arretierschraube sichern.

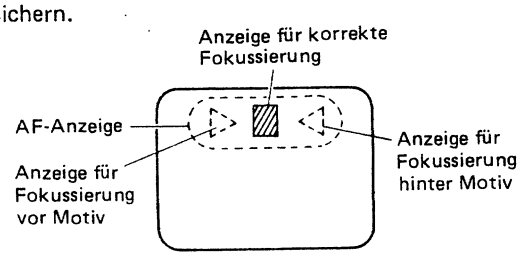


Abb. 3-8-7

5. Die Schritte von 3.8.3 wiederholen. Hierbei jedoch den Abstand zwischen AF-Einstellvorlagekarte und AF-Einheit auf 4 m erweitern.
6. Unter Beachtung der Sucheranzeige mit einer Pinzette den Focus-Bias-VR drehen, bis eine Focusanzeige erscheint. Die Position beibehalten, bei der die AF-Sucheranzeige zwischen Drehen im und gegen den Uhrzeigersinn erlischt.
7. Zur Gewährleistung eines einwandfreien AF-Betriebs alle Prüfpunkte von Tabelle 3-8-1 durchgehen.

Punkt	Überprüfen	Korrektur
Autofocus	Bei Anordnung von Abb. 3-8-3 mit Teleposition des Zoomobjektivs ist nur ein geringer Unterschied zwischen AF-Fokussierung und manueller Fokussierung feststellbar.	Nochmals die manuelle und AF-Entfernungseinstellung prüfen.
Fokussierdauer	Der Focus-Antriebsmotor bewegt die Linse in 3 Sekunden von der 1-m zur Unendlichposition (∞) (20°C).	Die Verbindung zwischen AF-Platine und AF-Motor überprüfen. Auf Störungen zwischen AF-Linsenhalterung und AF-Antrieb (Ausgang) achten.
AF-Steuerzeiten	Bei Anordnung von Abb. 3-8-3 mit Teleposition des Zoomobjektivs ist Fokussierung von der Unendlich- (∞) oder 1-m-Position innerhalb drei Antriebsperioden erzielbar.	Nochmals die Einstellung für Focus-Bias vornehmen.
Niedriger Kontrast	Bei auf einfarbige, nicht gemusterte Karte ausgerichteter AF-Linse erscheint keine AF-Anzeige und es ist keine AF-Funktion bemerkbar. (Die AF-Anzeige erscheint nur einmal kürzer als 5 Sek. oder überhaupt nicht (20°C)).	Auf ungleichmäßige Ausleuchtung und Verunreinigung der Karte achten.
AF-Meßbereich Überprüfen	Bei Anordnung von Abb. 3-8-3 liegt der AF-Meßbereich in der Bildmitte.	Die Anordnung der Vorlage überprüfen und die Kurzschlußschaltung überprüfen.

Table 3-8-1